H-88-13

SOUTHWEST FISHERIES CENTER

NATIONAL MARINE FISHERIES SERVICE

HONOLULU LABORATORY

2570 DOLE STREET

HONOLULU, HAWAII 96822-2396

July 1988

LIBRARY
SFP 2 1988
National Marine Fisheries Service
2570 Dole Street
Honolulu, Hawaii

CHECKING PROCEDURES FOR HAWAIIAN MONK SEAL CENSUS DATA

Tim Gerrodette and Fred R. Frizelle, III
Southwest Fisheries Center Honolulu Laboratory
National Marine Fisheries Service, NOAA
Honolulu, Hawaii 96822-2396

NOT FOR PUBLICATION

ADMINISTRATIVE REPORT H-88-13

This report is used to insure prompt dissemination of preliminary results, interim reports, and special studies to the scientific community. Contact the authors if you wish to cite or reproduce this material.

Southwest Fisheries Center Administrative Report H-88-13

CHECKING PROCEDURES

FOR HAWAIIAN MONK SEAL CENSUS DATA

Tim Gerrodette and Fred R. Frizelle, III
Southwest Fisheries Center Honolulu Laboratory
National Marine Fisheries Service, NOAA
Honolulu, Hawaii 96822-2396

July 1988

NOT FOR PUBLICATION

ABSTRACT

Data checking and editing procedures for Hawaiian monk seal, Monachus schauinslandi, census data are described. Data are checked in stages on the Honolulu Laboratory's Mohawk computer by a series of specially written computer programs. Error messages from these checking programs are explained in detail. Data format and storage procedures, documentation, source code module descriptions, and instructions for running all checking programs as well as customized utility programs are covered in this report.

CONTENTS

	Page
Introduction	1
Overview of Checking Procedures	1
Data Entry and Format	4
Checking Programs	4
Association Checking Program	4
Data Standards	6
Data Verification Program	6
Data Standards	7
Sighting Selection Program	7
ID-Sighting List Program	8
ID List Formatting Program	8
ID List Checking Program	8
Data Standards	9
Haul Chart Program	9
Standardization Program	9
Data Standards	11
Combining, Reformatting, and Sorting Program (RM009T01)	11
Utility Programs	12
Listing Utility Program	12
Short Reformatting Program	12
Multiple Replacement Program	13
Reverse Formatting Program (RM009T04)	13
Program Documentation and Data Storage	13

TABLES

Page

Table 1.--Island codes and sectors used for Hawaiian monk seal data 16

Table 2.--Data entry format for monk seal census data (source ID RM009AA1) 18

Table 3.--Data format for monk seal ID list data (source ID RM015AB1) 21

Table 4.--Explanation of messages from the association checking program 22

Table 5.--Explanation of messages from the data verification program 27

Table 6.--Explanation of messages from the ID list checking program 35

Table 7.--Codes used in the "questionable" columns 38

Table 8.--Explanation of messages from the standardization program 41

Table 9.--Skeleton Job Control Language (JCL) to combine, reformat, sort, and renumber monk seal data files 47

Table 10.--Data format for monk seal census data (source ID RM009AC1) 53

Table 11.--Data format for output of the short reformatting program (source ID RM009M07) 54

APPENDIXES

Page

Appendix A.--Components of monk seal census data checking system 57

Appendix B.--A guide for checking and correcting monk seal census data 64

Appendix C.--A guide for running monk seal data checking programs 70

Appendix D.--Monk Seal Data Status Form 73

Appendix E.--Seal Census Form 74

Appendix F.--Directions for completing the Seal Census Form 76

Appendix G.--Directions for completing the ID list 82

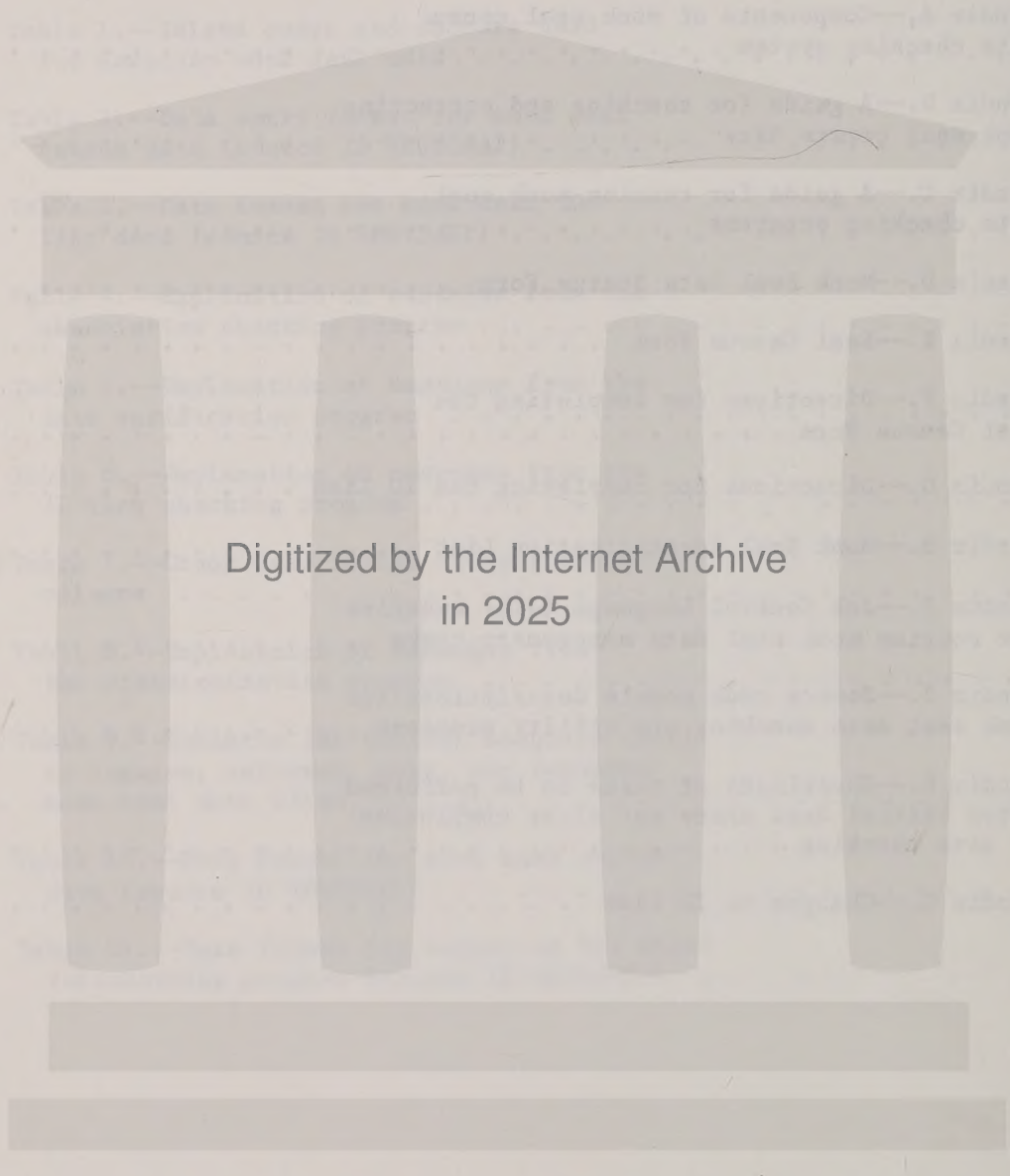
Appendix H.--Monk Seal Identification List 85

Appendix I.--Job Control Language (JCL) examples for routine monk seal data management tasks 86

Appendix J.--Source code module descriptions for monk seal data checking and utility programs 101

Appendix K.--Checklists of tasks to be performed after initial data entry and after completion of data checking 138

Appendix L.--Changes to ID list 140



Digitized by the Internet Archive
in 2025

https://archive.org/details/administrative-report-lj_1988-07_13

INTRODUCTION

Several types of data on the Hawaiian monk seal, Monachus schauinslandi, are collected by the Marine Mammals and Endangered Species (MMES) Program of the Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service (Gilmartin et al. in prep.[1]). The data type most widely collected is the standardized bleach count of seals around midday, termed census data. This report documents the procedures and programs by which raw census data are converted into electronic form and checked for errors. The final result of the checking and editing process is a data file whose format and standards are defined herein.

According to procedures adopted by the MMES Program, a census is a complete count of seals present on an island's beaches, beginning around 1300 and finishing in as short a time as possible (footnote 1). Although this report is primarily concerned with census data, noncensus data (e.g., patrol data) can be checked by using the described procedures, as long as the census form directions and codes are followed.

The report is organized as follows. An overview of the entire checking procedure is presented first, followed by a description of the format of the census data files and associated identification (ID) files. The main part of the report describes the checking programs and explains their error messages. Other specific utility programs are then described, followed by data storage and backup procedures. A final section of appendixes documents existing forms, instructions, and source code descriptions.

OVERVIEW OF CHECKING PROCEDURES

Because of the amount and complexity of the census data, checking and correcting them require several steps. A series of specialized computer programs has been written in MOBOL, a Mohawk[2] version of COBOL, to complete the field data in various ways and to flag possible errors. The programs are written to act conservatively; they do not change any data unless the needed change is unambiguous. Generally the programs are limited to detecting possible errors in the data. Members of the MMES Program are responsible for deciding which changes must be made and for indicating those changes on a data listing. For each data file, the series of marked

---

[1]Gilmartin, W. G., T. C. Johanos, J. R. Henderson, D. J. Alcorn, and T. Gerrodette. Manual of field procedures for the study of the Hawaiian monk seal. Manuscr. in prep. Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, 2570 Dole Street, Honolulu, HI 96822-2396.

[2]Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

data listings forms a record of manual corrections, and the series of program outputs forms a record of automatic corrections and additions. Thus, a complete record of changes made to the original data file is preserved. All checking and editing are done on the Honolulu Laboratory's Mohawk Series 21 computer, with the final corrected data files written to tape on the University of Hawaii's IBM 3081D mainframe computer.

The monk seal census data checking system involves people in both the MMES Program and Data Management and Technical Services (DMTS) of the Honolulu Laboratory (Fig. 1). Appendix A summarizes the components of the whole system. The process begins when data sheets are brought in from the field. The MMES person responsible for a particular data set is given a detailed guide for checking and correcting monk seal census data (Appendix B). There is a corresponding guide for DMTS or MMES personnel running the checking programs (Appendix C). The stages in the data checking process are briefly summarized:

Stage 1. Data entry.--The data sheets are collected together, checked for legibility and completeness, and organized chronologically. After data are entered and verified via the Laboratory's Mohawk entry system, they are stored on tape until checking is begun.

Stage 2. Association checking.--The association checking program checks the logic and completeness of seal associations. It also performs several other functions, such as filling in incompletely coded continuation lines.

Stage 3. Data verification.--The data verification program checks whether data in each field are of the proper type (i.e., numeric or alphanumeric) and fall within certain ranges. In some fields, only certain characters are permitted. This program is similar to ordinary data screening programs.

Stage 4. ID list preparation.--The ID-sighting program focuses on known individual seals, identified either by ID, bleach, or tag numbers. It produces a sorted list from which a preliminary ID list of known seals seen by island and year is prepared and entered on the computer. The ID list checking program and the haul chart program are used to check, correct, and complete the ID list.

Stage 5. Standardization.--With the ID list as a reference, the standardization program completes and standardizes ID, bleach, and tag numbers; size; and sex of each known seal in the data file.

Stage 6. Combining, reformatting, and sorting.--The data are combined if entered as more than one batch for an island, reformatted to a uniform record type, and sorted. The finished data files are stored on tape by island and year.

The programs are designed to be run sequentially--that is, stage 1 should be completed before proceeding to stage 2; otherwise, spurious error messages may be generated. However, programs run at earlier stages can be run again at a later stage. During the checking process, the progress of

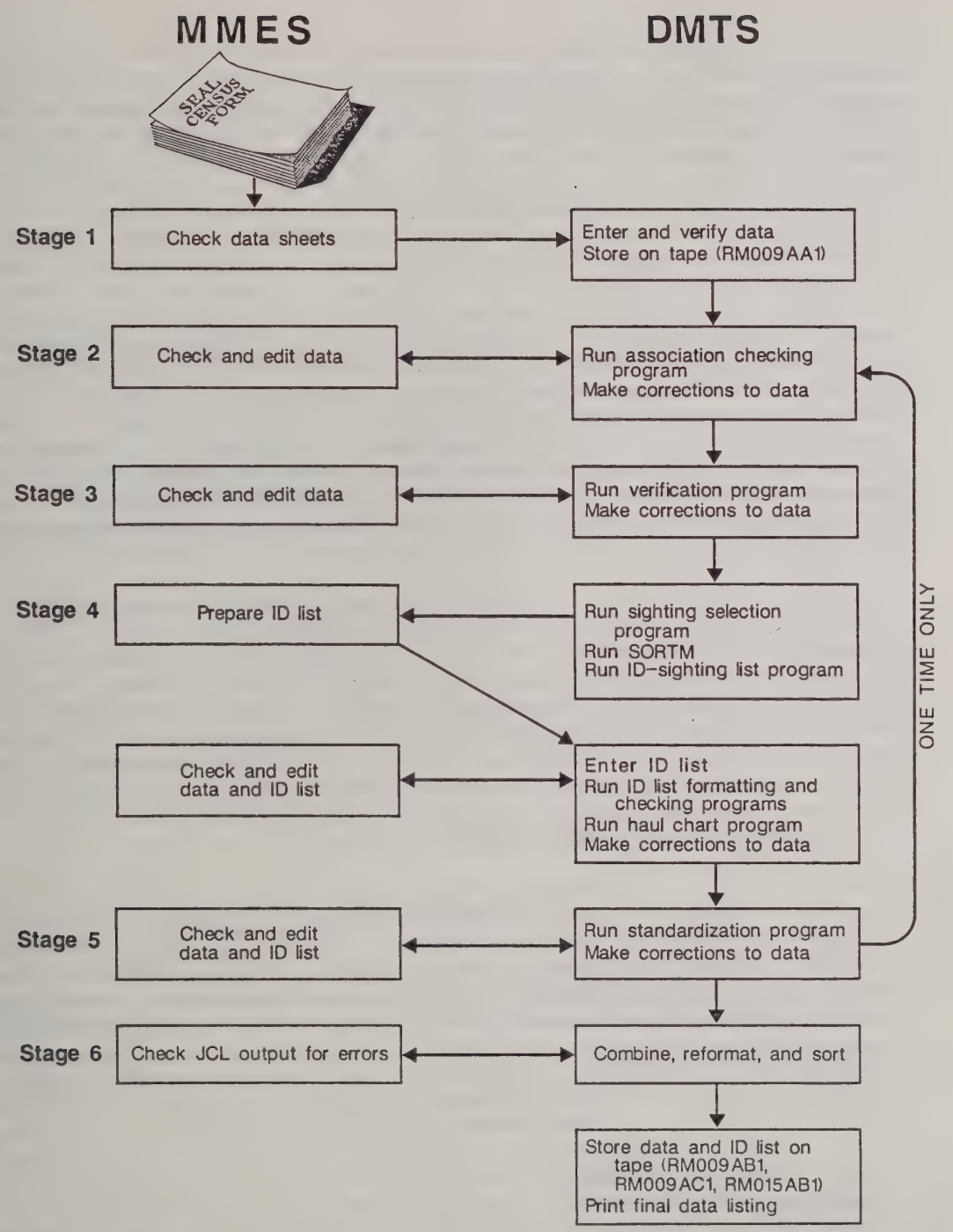


Figure 1.--Stages in monk seal data checking. The data progress from the census forms filled out in the field to corrected and edited records stored on magnetic tape. MMES = Marine Mammals and Endangered Species; DMTS = Data Management and Technical Services.

each batch of data is recorded on a Monk Seal Data Status Form (Form HL-0146; Appendix D). This form helps track each data set and serves as a record of the date on which each stage of checking was completed. The Monk Seal Data Status Form is normally attached to a folder containing the computer printouts so the form can be initialed and dated at each stage.

DATA ENTRY AND FORMAT

Census data are entered into the computer from the Seal Census Form (Form HL-0118; Appendix E), which is filled out in the field according to directions (Appendix F). Data should be grouped in batches containing only 1 yr and island group (island codes 10, 20, 30, 40, 50, 60, 70, or 80; see Table 1). The census data are entered and verified with source ID code RM009AA1 on the Laboratory's Mohawk computer, by the screen definition RM009C01. On entry, the data sheets are not assumed to be in any order, except that all pages within a multipage census or patrol must be together. However, it is recommended that the data be in chronological order to greatly simplify later checking. Data fields within each record type are given in Table 2.

An ID list is a data set for all identified seals seen on that island during that year; directions for this list are in Appendix G. The ID list is entered directly from Form HL-0147 (Appendix H) with source ID code RM015AA1, by using screen definition RM015C01. After entry, the ID list entries are given sequence numbers by using the program RM015X01 (Table 3). The ID list is used by the haul chart and standardization programs as a reference list of identified seals. The ID list may be entered at any time prior to running the standardization program, but it is normally entered after the ID-sighting program (stage 4) has been run, because output of that program aids in completing the ID list.

CHECKING PROGRAMS

Most checking and utility programs are written in MOBOL to run on the Laboratory's Mohawk computer. A few programs that run on the University of Hawaii's IBM mainframe are written in PL/1. The programs are described in the order that they are normally run.

Association Checking Program

Source code: RM009M01
Executable code: RM009X01

The association checking program is the first program to be run on a data set after it has been entered. The program performs a variety of functions, including completing certain data entries and checking associations for logic and completeness. The program works by copying a file of census data to another file that is a new version of the original data set. The new version differs from the old in seven ways:

(1) Continuation lines are filled to conform to the line being continued. Size, sex, ID, bleach, and molt are copied to the continuation line if they are not already coded on it. If any of these fields are explicitly coded on the continuation line and do not match the original line being continued, the fields are not copied; instead, a warning message appears. Sector, tag information, and beach position are copied only if blank on the continuation line because entries in these fields may differ from the original line. Disturbance, note code, association time, line number, distance, and behavior codes are never copied to the continuation line.

(2) The nursing (N) and location (L) associations are filled in when half the paired association has been coded in the original data. An L association code may be filled in either in response to another L code or to an active behavior code. If there is no room to fill in the L association (both A and B associations are already coded), a new continuation line is created at the bottom of the page. The N associations, however, are always on the original line, so if an N association needs to be added, an L association may be displaced and moved to a new continuation line.

(3) Records marked as deleted, or completely blank, are eliminated.

(4) Behavior code 0 is added for unassociated seals on a census.

(5) Leading blanks in line reference numbers are changed to 0.

(6) If association B contains an entry but association A does not, the association is moved from B to A.

(7) The source ID code is changed from RM009AA1 to RM009AB1.

The emphasis in this program is on checking associations between lines of data on each page. The page-header records are merely copied to the new file. Associations on each page of the census are resolved by pairing the two associated entries. An association coded without a counterreference will cause a new N or L association to be coded in the data, or a message indicating that it cannot be resolved. Printed messages flag improper association formats, unmatched or improperly matched active behaviors, unexpected behavior codes, and references to lines coded as unassociated or not within the page. The total number of associations in each page, if uneven, is printed out.

Each time the association checking program is run, a new data set is created. To keep track of the data sets, the following naming convention has been adopted. On entry, the data set is assigned a batch number, such as D85052. When the association checking program is run, the new data file created by the program is assigned the same batch number with a one-letter suffix that increases alphabetically each time the program is run. Thus, D85052 would become D85052A after the first run, D85052B after the second, and so on.

The report printed during the run begins with a title block, printed from the operator's screen, showing input and output data sets, island and year of the data, and run date from the Mohawk system. An individual line in the report displays a line of data, a message explaining a change made or ambiguity found, and a record number for editing purposes. A report trailer similar to the header is printed at the end of a run. The report messages produced by the association checking program are explained in Table 4.

Data Standards

All output messages from the association checking program should be checked and resolved if possible. Some messages indicate an unlikely but not necessarily incorrect condition. Therefore, even after the data have been checked, certain messages may continue to be printed (cf. Table 4, group C):

Assoc time doesn't appear to match line nn
Beach position different from line nn
Behavior 0 on continuation line
Distance code missing
Line no appears twice in associations
Sector different from line nn

After the data have been checked and corrected, no other messages from the association checking program should be present.

Data Verification Program

Source Code: RM009M03
Executable Code: RM009X03

The data verification program examines a file of census data for conformity to criteria established for each data field (Table 2). Page-header records are checked for conformity in groups (e.g., page 1 of 3, 2 of 3, and so on), but other records are checked independently of each other.

The report begins and ends with a title block showing the filename, island, year, and run date. Within the report, each line displays a record that has an entry not meeting the criteria in Table 2, a message about the error, and a record number for editing purposes. An individual record is printed only once; any number of messages about the record may appear. Report messages for the data verification program are explained in Table 5. In addition, two lists are compiled during the run and printed near the end of the report. One is a list of observers' initials appearing in the file; the other is a list of data types appearing in the file. Both lists should be checked for possible mistakes.

Data Standards

All output messages from the verification program should be checked and resolved if possible. Some messages indicate an unlikely but not necessarily incorrect condition. Therefore, even after the data have been been checked, certain messages may continue to be printed (cf. Table 5, group B):

A line number or distance missing
Association time appears out of order
B line number or distance missing
Batch number is different
Begin or end time is out of range for Census
Begin time is out of range for Atoll count
Behavior M by non adult or subadult male
Census with no time reported
Continue line number > 39 or not numeric
Island/atoll different from first record
Line no. appears twice in associations
Line number > 64 or not numeric
Line number out of sequence
No nursing behavior for pup
Sector not valid for island
Year is incorrect

After the data have been checked and corrected, no other messages from the verification program should be present.

Sighting Selection Program

Source Code: RM009M04
Executable Code: RM009X04

The sighting selection program is the first of a series of three programs which together produce an ID-sighting list (stage 4). This program creates a temporary file of ID, bleach, and tag information; size; sex; date; record number; and molting or nursing status for each sighting of an identified seal in the census data. No printed report is generated. The temporary sighting file produced by the sighting selection program is sorted by the Mohawk SORTM program and then printed by the ID-sighting list program described next. Directions for carrying out these steps are given in Appendix C.

ID-Sighting List Program

Source Code: RM009M05
Executable Code: RM009X05

The ID-sighting list program prints a sorted list of sightings of identified animals from a temporary file created by the sighting selection program, by using a sequential index created by the Mohawk SORTM program.

A report header and trailer are produced, showing the data sets involved, batch number, island and year of the original data, and run date. The body of the report has, against the left margin, the identification, bleach, and tag data for each identified seal and, arranged in blocks to the right, the sighting dates, size and sex codes, nursing or molting conditions, and record numbers for that seal. The sightings are printed 10 per row. A repeat sighting of a seal on the same day is marked with an asterisk. If an ID is recorded as questionable (a number "1" in the "?" column), it appears as a question mark in the ID-sighting list. Identified turtles are listed separately after seals. The ID-sighting list is used to aid completion of an ID list (see earlier section on data entry and format).

ID List Formatting Program

Source Code: RM015M01
Executable Code: RM015X01

The ID list formatting program adds a sequence number to each record of an ID list, putting it in the format given in Table 3. The program should be run before the ID list is used in the ID list checking program (RM015X02), the haul chart program (RM009X09), or the standardization program (RM009X06). It should be rerun each time a change made to the ID list affects its numbering (i.e., deletion or insertion of records).

ID List Checking Program

Source Code: RM015M02
Executable Code: RM015X02

The ID list checking program performs a series of checks on an ID list. The program checks the current ID list internally (e.g., making sure that the same seal is not listed twice), or externally against as many as 10 previous ID lists (e.g., making sure a new ID does not appear on any previous list). Records marked as a new ID (with a number "1" in the "new ID?" column on the current ID list) should not appear on any previous ID list, and records marked as an old ID (without a number "1" in the same column) should appear on at least one of the previous lists. When an ID is matched on a previous list, other information is checked for consistency. Messages from the ID list checking program are explained in Table 6.

Data Standards

All output messages from the ID list checking program should be checked and resolved if possible. Some messages indicate an unlikely but not necessarily incorrect condition. Therefore, even after the data have been checked, certain messages may continue to be printed (cf. Table 6, group B):

Duplicate ID on record n
Nursing ID not on ID list
Old ID not in any previous ID list
Tag different in X, record n

Haul Chart Program

Source Code: RM009M09
Executable Code: RM009X09

The haul chart program generates output on sightings of identified seals to assist completing and checking both the census data and the ID list. Before the haul chart program can be run, a ID list must be prepared, but it does not have to be completely checked and corrected. To prepare a complete haul chart, the haul chart program must be run on each batch of data for that island and year. The output does not contain explicit error messages, but the listing of dates and sightings helps find errors in both the ID list and census data.

For each seal, the haul chart program produces a listing of first and last sighting dates and begin and end molt dates. The program chooses as the begin molt date the first date on which the seal's molt is recorded as >10%; it selects as the end molt date the day after the date on which the seal's molt is last recorded as <100%. These dates are not necessarily the best estimates of the seal's true molting period, but when added to the ID list, they suffice for the checking performed by the standardization program. The program also flags, as probable errors, each seal whose molt is apparently lasting more than 15 d or whose molt or nursing sequence is not continuous. The haul chart displays the sightings of identified seals for each day of the year. An asterisk indicates that the seal was sighted on that date, a question mark that it was possibly sighted, an M that it was sighted and molting (percent molt was >10 and <100%), and a P that it was sighted as part of a nursing pup-mother pair.

Standardization Program

Source Code: RM009M06
Executable Code: RM009X06

The standardization program completes and standardizes all references to known individual seals. It changes data records for each definitely identified seal in the file to reflect the information

on an ID list, thus "standardizing" sightings of a particular seal throughout the file. The modified records are written to a new (output) data file, with source ID code RM009AC1. The naming convention for the output data file is to continue the alphabetic suffix series begun with the association checking program. Records with no identification or with questionable identification are copied to the output file unchanged. The standardization program also checks that age of pups and molt condition of all seals in the data file are consistent with molt, birth, and wean dates given on the ID list.

The ID list is a separate file created under source ID designation RM015AA1. Before its use with the standardization program, the ID list should be numbered by the ID list formatting program, which also changes the source ID to RM015AB1. Because the ID list is used as a reference by the standardization program, it should be carefully reviewed and checked before the standardization program is run. There is one ID list for each island for each year. One ID list may, therefore, be applicable to several data batches.

The standardization program consults the ID list to get information on ID, bleach, tag, size, sex, molt begin and end dates, and birth and weaning dates each time a definitely identified seal is encountered in the data file. When an entry in the ID list is matched with a record in the census data, the census data record is modified to contain all the ID, bleach, and tag information from the list, and size and sex are changed to reflect those in the list. The ID, bleach, or tag numbers not in the original data but added by the standardization program are indicated by a number "2" in the "?" column of each entry. In addition, ID, bleach, or tag numbers added for nursing pups by association with the mother are indicated by a number "3" in the "?" column. Partially read bleach or tag numbers filled in by reference to some other certain identification (e.g., scars or a tag on another flipper) are indicated by a number "4" in the bleach or tag "?" column. Table 7 explains these special questionable codes in more detail.

If begin or end molt dates are entered on the ID list, the standardization program checks the estimated percentage molt on each date, together with any special code in the molt questionable column, for consistency with dates given on the ID list. Inconsistencies are flagged with error messages. The special molt questionable codes are explained in Appendix B (under section on standardization (stage 5)) and in Table 7.

All changes made to the data are flagged with output messages. If some information in the data file does not match the ID list, or if the change required to standardize the data indicates a probable error, an error message is produced, and the record is not modified. Report messages produced by the standardization program are explained in Table 8. When standardization of the data is complete (when no error messages remain), the input file is saved on tape with source code RM009AB1, and the output file is used in the next stage (combining, reformatting, and sorting).

Data Standards

Most output messages of the standardization program should indicate changes made to the data for consistency with the ID list. These messages appear in group A of Table 8 and do not require checking. Messages in group D of Table 8 show improbable but not necessarily incorrect conditions; they should be checked. As a visual aid in picking out these messages, they are left justified in the message area. Messages in groups B and C of Table 8 indicate error conditions that must be resolved. Data standardization is complete when no output messages, or only messages in groups A (and possibly D) of Table 8, appear. As a visual aid, the messages in groups B and C are flagged with an "*" or "o" in the right column, respectively. No messages with these flags should be present in the final run of the standardization program.

Combining, Reformatting, and Sorting Program (RMC09T01)

The final stage in processing batches of census data is performed on the University of Hawaii's IBM mainframe, using Job Control Language (JCL) to coordinate execution of several programs and high capacity disk storage to combine several batches into a large final tape file. An annotated skeleton of the JCL to accomplish these tasks is given in Table 9.

Input to the program is composed of any number of files already standardized, i.e., output from the standardization program. These files customarily reside on the working tape, but may reside on the Mohawk, where they can be embedded in the job stream. The program calls a formatting routine written in PL/1 (RMC09T02), which reformats the combined input to specifications of RMC09AC1 (Table 10) and transforms the two separate types of records (page headers and individual log entries) into one homogeneous format. The number of records read in, manipulated, and written out is checked and printed. The resulting file is stored temporarily on disk.

Next, data are sorted by the IBM system sort program, SYNCSORT. The sort procedures used for census and noncensus data differ slightly. Noncensus data are sorted in the following order: date, data type, island, number of the census or patrol, time, observer, page number, and line number. Census data are sorted in the same order, except that time and observer are not used because a census may be conducted by more than one observer and the times for different observers may not match exactly. Separately sorted census and noncensus portions are merged together by date into another temporary file.

In the final step, the program calls the renumbering routine (RMC09T03), also written in PL/1, which changes any records containing an L in the notes column to data type I (incidental observation), checks for duplicate records, checks that all islands are present within an atoll count (data type A), and adds sequence numbering according to DMTS conventions. Messages are produced for each record changed to an incidental observation and for any errors detected. The final file is written to tape in the format given in Table 10.

The combining, reformatting, and sorting program normally accepts as input poststandardization files--that is, data files with source ID code RM009AC1. By using the //SYSOPT NO ID CHK option (cf. Table 9), however, checking of the source ID code may be suppressed. This allows prestandardized files to be checked for duplicate lines and completeness of atoll counts--checking performed by RM009T03--at an earlier stage. If the program is used in this way, the last //SYSOUT command should specify a dummy file to prevent writing the output to tape (see end of Table 9).

UTILITY PROGRAMS

Listing Utility Program

Source Code: RM009M02
Executable Code: RM009X02

The listing utility program prints a file of monk seal census data (RM009) or a monk seal ID list (RM015). Sequential record numbers are listed down the right side of the report. Header and trailer blocks containing the type of data, filename, number of records, and run date complete the listing.

A file is normally listed whenever cumulative changes made since the last listing are significant enough to make further editing difficult. Inserted or deleted records affect record numbering, thus also requiring a new listing.

Short Reformatting Program

Source Code: RM009M07
Executable Code: RM009X07

The short reformatting program converts monk seal census data into a form that can be conveniently transferred to the Molecular system by several techniques: direct to Molecular via IBM tape and Cipher tape drive, or Kermit via IBM disk and the PACX network. The input file is in the format of Table 2 (source ID RM009AA1 or RM009AB1). The output file has homogeneous records containing all the information from each entry in the file, but with only the island code, date, and data type copied from the header record. An asterisk is placed into column 80 of each output record to ensure it will be treated as a fixed length record during any transfer procedure. The format for data files created by the short reformatting program is in Table 11.

The short reformatting program normally is used on an incompletely corrected Mohawk data file to produce a temporary data file with homogeneous records from which some summary statistics can be produced. Thus, it is not necessary to wait until data have been completely corrected and edited to obtain some preliminary summaries for reports.

Multiple Replacement Program

Source Code: RM009M08
Executable Code: RM009X08

The multiple replacement program operates similar to an ordinary search-and-replace command in an editor, but it allows for multiple replacements of ID or bleach numbers to occur in a single pass through the data. This is useful if several ID or bleach numbers must be changed.

Reverse Formatting Program (RM009T04)

After monk seal census data have been processed through to the final reformatted form, reconstituting the original form of the data is possible by the reverse formatting program, a PL/1 program run on an IBM mainframe. The program expects input in the format of RM009AC1 (Table 10) and generates output in the format of RM009AA1 (Table 2). Like the other programs run on the IBM system, input and output may be on any media, including output directly to the Mohawk system, with the restriction that records of maximum length 80 can be transferred between the two systems. An example of the JCL to run this program is given in Appendix I, No. 7.

PROGRAM DOCUMENTATION AND DATA STORAGE

The source code for the checking programs described in the preceding sections is maintained in the DMTS area at the Honolulu Laboratory. The programs are structured and contain numerous comments. In addition, the operation of each subprogram unit is detailed in Appendix J. General instructions for running the checking programs are in Appendix C, and examples of JCL to accomplish various data management procedures are in Appendix I.

Except for the program documentation noted above, all information (e.g., original census forms, editing changes, data listings) stored on paper is maintained by the MMES Program, while information stored on magnetic media is maintained by DMTS. Generally, tapes are used for permanent storage of data, and floppy diskettes for temporary storage. Diskettes are particularly useful for rapid restoration of data to the Mohawk, which is not directly connected to a tape drive.

Appendix A summarizes the components of the checking system and the final destination of all elements. When monk seal census data are first entered and verified in batches on the Mohawk system, they are identified with the source ID code RM009AA1 and should be transferred to the appropriate primary (master) and secondary (backup) tapes before any further

processing is attempted (Fig. 1). This straightforward task uses the IBM utility program IEBGENER to copy the 80-column card images embedded in the job stream to a standard tape file. After the transfer has been completed, IEHPROGM is used, usually via TSO, to catalog the data set. Documentation is updated according to DMTS procedures. A checklist of tasks is provided in Appendix K, part I.

When data checking and editing begin (stage 2), the source ID code becomes RM009AB1. Batches are backed up on the working tape whenever a significant amount of editing has been done. If the checking process has not been completed, files may be brought from the working tape to resume editing at a later time. After a clean run of the standardization program has been achieved, the batch should be passed through the association checking and verification programs once more (Fig. 1), because errors not present when those programs were originally run may have crept in during later editing.

After this second pass through the checking programs has been completed, the batch is run through the standardization program for the last time. At this point, two files will exist for a single original batch: the input file, which is considered to be fully edited, and the output file, which is standardized and ready to be combined. After combining, formatting, and sorting via JCL (cf. Table 9) have been accomplished without error, the input files are stored on tape with source ID code RM009AB1, and the final data file is stored on tape with source ID code RM009AC1. Several steps are necessary to complete the checking procedure, store all files on tape, and document locations and names of all files. A checklist of final DMTS tasks is given in Appendix K, part II.

The final data file, usually consisting of several combined batches, is given a five- or six-character alphanumeric name of the form IIIYYT, where III is an island name abbreviation, YY is the year, and T is optionally used to specify a data type. For example, LAY85C would contain 1985 census data for Laysan Island, and FFS87 would contain both census and patrol data from French Frigate Shoals in 1987. The final ID list is similarly given a descriptive seven-character name of the form IIIYYID--e.g., FFS87ID for the 1987 ID list at French Frigate Shoals.

Final data files and ID lists are stored on permanent tape in the MMES data area. Permanent tapes are documented and data sets are cataloged in the same way as all others within the Honolulu Laboratory DMTS system. Source ID codes and tape volume numbers are summarized:

Description	Source ID code	Tape volume	Tape number	
			Primary	Secondary
Monk seal census data				
After entry on Mohawk	RM009AA1	I	X22988	X22611
		II	X60993	X61082
After editing is complete	RM009AB1	--	X59666	X59667
After standardization and reformatting	RM009AC1	--	X59828	X60999
Monk seal ID list data	RM015AB1	--	X23032	X23033

After data checking has been completed, new information in the future may necessitate a change in either the census data or ID list. Changes to an ID list after it has been written to permanent tape (RM015AB1) are recorded and dated on Form HL-0161 (Appendix L). Changes to census data after data checking and editing have been completed should be made to the appropriate prestandardized batch file (RM009AB1). In either case, all data batches for the year will have to be brought back from the RM009AB1 tape to the Mohawk. After the changes have been made to the census data or ID list, the data must be restandardized, then combined, formatted, and sorted as before. This procedure is necessary to ensure that future corrections, additions, and improvements in the individual identification of seals can be correctly propagated through the data.

Table 1.--Island codes and sectors used for Hawaiian monk seal data. For maps showing sectors on each island, see Gilmartin et al. (text footnote 1).

Island or atoll	Island code	Sectors
Nihoa	10	1-5
Johnston	11	
Niihau	12	
Kauai	13	
Oahu	14	
Molokai	15	
Lanai	16	
Maui	17	
Kahoolawe	18	
Hawaii	19	
Necker	20	1-10
French Frigate Shoals	30	1-10
Tern	31	1-10
East	32	1-10
Whale-Skate	33	1-6
Trig (and Triglet)	34	1-3
Shark	35	1
Disappearing	36	1
Gin	37	1-2
Little Gin	38	1-3
Bare	39	1
Round	91	1
Mullet	92	1
Other	93	1
La Perouse	94	1
Laysan	40	1-20
Gardner Pinnacles	45	1
Maro Reef	46	1
Lisianski	50	1-49
Pearl and Hermes Reef	60	1-7
North	61	1-5
Little North	62	1-2
Southeast	63	1-7
Seal-Kittery	64	1-4
Grass	65	1-3
Sand	66	1
Bird	67	1
Other	69	1,2

Table 1.--Continued.

Island or atoll	Island code	Sectors
Midway	70	1-6
Sand	71	1-6
Eastern	72	1-4
Spit Islands	73	1
Other	74	1
Kure	80	1-13[a]
Green	81	1-8, 13[a]
Shark	82	9
Sand	83	10
Stark	84	11
Other	85	12
Other, including pelagic sighting	99	

[a]Sector 13 is the ocean-beach enclosure for female monk seal pups in the captive maintenance program at Green Island, Kure Atoll.

Table 2.--Data entry format for monk seal census data (source ID RM009AA1). In the data verification program, the data are checked according to the criteria in the right-hand column. Further explanations of the codes for each item are given in the census form directions (Appendix F).

Column	Record type	Item	Checking criteria
1-8	1	Source ID code	RM009AA1 on entry; RM009AB1 after association checking program
9-10	1	Island code	Must be a valid island code (Table 1); usually only one island or atoll per file
11-13	1	Observer	First position must be alphabetic (not blank or numeric)
14-17	1	Time begin	Must be numeric between 0001 and 2400, with minutes between 00 and 59. If a census, the time at which it began should be between 1100 and 1500.
18-21	1	Time end	Must be numeric between 0001 and 2400, with minutes between 00 and 59, and be greater than or equal to the number listed under time begin. If a census, the time at which it ended should be <1800.
22	1	First page	Must be numeric
23	1	Last page	Must be numeric and not less than the number listed under first page
24-25	1	Year	Must be numeric; usually constant within a file
26-27	1	Month	Must be numeric between 1 and 12
28-29	1	Day	Must be numeric and >0 but not greater than the possible number of days in the reported month
30	1	Data type	Must be alphabetic
31-33	1	Number	Must be numeric and <100, or blank

Table 2.--Continued.

Column	Record type	Item	Checking criteria
34-35	1	Temperature	Must be numeric between 10 and 40 (degrees Celsius), or blank
36	1	Wind strength	Must be 0, 1, 2, or blank
37-38	1	Wind direction	Must be NW, NE, SW, SE, NN, EE, SS, WW, or blank
39-40	1	Cloud cover	Must be numeric between 0 and 10, or blank
41	1	Precipitation	Must be 0, 1, 2, 3, or blank
74-79	1	Batch number	Must be alphanumeric and constant within a file
80	1	Record type	Must be 1
1-8	2	Reserved	
9-10	2	Line number	Must be numeric between 1 and 64 and in ascending sequence for each page
11-12	2	Sector	Must be numeric, and valid for the island coded at the top of the page (see Table 1). Blanks and 99 (i.e., island not present) are also permitted.
13-14	2	Size	Must be P, P1, P2, P3, P4, P5, PW, J, J1, J2, I, S, S3, S4, A, T, T1, T2, T3, or U
15	2	Sex	Must be M, F, or U
16-19	2	ID number	May be any alphanumeric characters
20	2	ID questionable	Must be 0, 1, 2, 3, or blank (see Table 7)
21-24	2	Bleach number	May be any alphanumeric characters
25	2	Bleach questionable	Must be 0, 1, 2, 3, 4, 5, or blank (see Table 7)
26-30	2	Tag number	May be any alphanumeric characters

Table 2.--Continued.

Column	Record type	Item	Checking criteria
31	2	Tag position	Must be L, R, B, or blank
32	2	Tag color	Must be G, K, M, B, T, R, Y, P, or blank
33	2	Tag questionable	Must be 0, 1, 2, 3, 4, 5, or blank (see Table 7)
34	2	Beach position	Must be 0, 1, 2, 3, or blank
35-37	2	Molt percentage	Must be numeric between 0 and 100, or bla
38	2	Molt questionable	Must be 0, 1, 2, 3, 4, or blank (see Table 7)
39	2	Disturbance	Must be 0, 1, 2, 3, or blank
40-43	2	Association time	Must be numeric, and between the time begin and time end for the page, or blank
44-45	2	A line number	Must be numeric between 1 and 64, 98, 99, or blank
46	2	A distance	Must be 0, 1, 2, 3, or blank
47-54	2	A behavior	Each two-character entry must be a valid behavior code for the current year (see Appendix F)
55-56	2	B line number	Same as A line number
57	2	B distance	Same as A distance
58-65	2	B behavior	Same as A behavior
66-67	2	Continue	Must be numeric between 1 and 39, or blan
68	2	Notes flag	May be any alphanumeric character
69-79	2	Reserved	
80	2	Record type	Must be 2

Table 3.--Data format for monk seal ID list data (source ID RM015AB1).

Column	Total	Item description
1-8	8	Source ID (RM015AB1)
9-10	2	Island
11-12	2	Year
13-16	4	ID number
17-20	4	Bleach number
21-25	5	First tag number
26	1	First tag position
27	1	First tag color
28-32	5	Second tag number
33	1	Second tag position
34	1	Second tag color
35-39	5	Third tag number
40	1	Third tag position
41	1	Third tag color
42	1	New ID flag
43-44	2	Size
45	1	Sex
46	1	Reserved
47-50	4	Molt begin date (month, day)
51-54	4	Molt end date (month, day)
55-58	4	Birth date (month, day)
59-62	4	Wean date (month, day)
63-66	4	Nursing ID
67-72	6	Batch number
73-80	8	Sequence number

Table 4.--Explanation of messages from the association checking program. Messages in group A are advisory messages, reflecting normal operation of the program, and require minimal checking. Messages in group B indicate errors that must be corrected. Messages in group C indicate unlikely but not necessarily incorrect conditions; hence, these messages may remain even after the data have been edited. Type 1 records are page-header data, whereas type 2 records are the lines of data on each page of the census form (cf. Table 2). The notation "nn" indicates where numbers would be printed by the computer. Messages indicating data may have been lost are flagged with asterisks.

A. Messages indicating a change made to the data

Behavior 0 filled in
: If the data type for the page is A or C, entries not referenced will have an 0 placed in association A, indicating unassociated condition.

Continuation entry filled from line nn
: Information has been copied from line nn to its continuation line.

Duplicate association B removed
: When two associations for an entry are identical, blanks are substituted for association B.

Leading zero added to line reference
: A reference to a line number (the line number itself, the line number in association A or B, or the continuation line number) had a leading blank that the computer replaced with the number zero.

Location association filled from line nn
: The uncoded half of a location association has been completed in response to active or passive behavior codes on line nn.

Location association nnnL on hold
: Location association nnnL has been displaced by a nursing association and is being held in a temporary area until it can be added to a continuation line. Before the end of the page, association nnnL should be filled in on a continuation of the original line from which it was displaced.

New continuation line created from line nn
: No blank associations were available when filling in a location reference on line nn, so a new continuation line was added to the bottom of the page.

Nursing association filled from line nn
: The uncoded half of a nursing association has been completed in response to a nursing behavior code on line nn.

Table 4.--Continued.

B. Messages indicating an incorrect condition

Association cites nonexistent line
: An association refers to a line that is not present within the page. A line of data may be missing, or the association line number may be in error. No further processing of the association is performed.

Association self reference
: An association contains the same line number as the entry itself, or one of its continuation lines. No further processing of the association is performed.

Cannot fill behavior L from line nn
: The proper association pair has been isolated, but all behavior code spaces have been filled previously, so L cannot be added.

Cannot fill N behavior from line nn
: The proper association pair has been isolated, but all behavior code spaces have been filled previously, so N cannot be added.

Continue line number equals line number
: The continuation line number is the same as the current line number on which it is entered. The continuation line number should be the line number from which the current line is being continued.

Continue reference not within page
: The line number in the continuation field is beyond the last data entry on the page. The error may be in the continuation reference, or a line of data may be misplaced.

***** Duplicate line no discarded *****
: Two type 2 records with the same line number have been found. This could occur if a page header is absent, or if a line number has been incorrectly entered. The record displayed will not be processed or copied to the output file.

Fill would mix N with other behaviors
: In the process of attempting to fill in a nursing association, other behaviors were found to be already coded. No filling in is performed.

Format of held association improper
: The format of the association put "on hold" after being replaced by a nursing association (see previous message "Location association nnnL on hold") is improper or incomplete in some way. The association itself is not displayed with this message, but it can be seen in the input file for the run.

Table 4.--Continued.

Improper association format A complete and properly coded association contains a line number, a distance code, and one or more behavior codes. This message indicates that one or more of these elements is missing, or that behavior O, X, or unassociated Z is present when a line number or distance code is present. No further processing of the association is performed. In particular, uncoded halves of location or nursing associations are not filled in if this condition exists.
Improper behavior code A behavior code other than those defined in the census form directions (see Appendix F and Table 2) was encountered within an association. Normal processing of the association continues.
Improper nursing association with line nn When a nursing association is recorded between two animals, one of them must be an adult female and the other a pup. Any other combination will produce this error message.
***** Line deleted ***** A record consisting of a line number only has been found. Such a record is not copied to the output file.
Line reference contains blank A reference to a line number (the line number itself, the line number in association A or B, or the continuation line number) consists of a number and a blank. The computer is uncertain whether to interpret this blank as the number 0 or whether a single-digit line reference was not right justified. No further processing of this record is performed.
Line reference not within page An association refers to a line beyond the last original line of the page. No further processing of the association is performed.
Mixed nursing & active behaviors Presence of behavior N with active behavior codes within the same association has been detected. No further processing of the association is performed.
On this page total no of associations = nn An odd number of associations, nn, is present on this page even after associations have been filled in. Since association references should always be in pairs, this indicates an error.

Table 4.--Continued.

Over 64 lines/page limit exceeded The program presently has the capacity of 64 lines per page; appearance of this message may indicate the data are causing a large number of extra continuation entries to be created and, thus, may be abnormal. Processing continues, but this message will appear whenever such an overflow record is produced. These records will not be copied to the output file and, hence, will be missing.
Reference to unassoc. animal from line nn An association on line nn refers to the displayed line where behavior O, X, or unassociated Z is present. Either line may contain an error. No further processing of the association is performed.
Size, Sex, ID or Molt doesnt match line nn Information coded on a continuation line conflicts with that present on line nn, the line being continued. This entry is not modified.
Unable to resolve association to line nn An active behavior code on the displayed line is unmatched by a corresponding association on line nn; thus, a probable error is indicated. No attempt is made by the program to fill in associations if active behaviors are involved.
Unequal distance code from line nn The distance codes present in an association are different. One of the associations is in error, because the distance codes should be equal.
***** Unexpected line no discarded **** A type 2 record with a line number <1, >64, or blank has been detected. It will not be processed or copied to the output file.
*** Unexpected record type discarded ** A record other than type 1 (page header) or type 2 (log entry) has been detected on input. It will not be processed or copied to the output file.
Unmatched J,C,D,P,Q,W,Y or L1 behavior from line nn These behaviors require specific matching behavior codes. Line nn contains one of these behavior codes, but the corresponding behavior code is not present on the displayed line. No attempt is made to fill in associations when this condition exists.

Table 4.--Continued.

C. Messages indicating an unlikely but not necessarily incorrect condition

Assoc time doesn't appear to match line nn
: The association time is more than 5 min apart from the association time on line nn, or from the last association time entered before line nn. Processing continues normally for the association.

Beach position different from line nn
: The displayed line and line nn are linked by an association, yet the beach positions are different. This message is displayed when the distance code is 0 if the beach positions are adjacent, or for any distance code if not adjacent. Processing continues normally for the association.

Behavior 0 on continuation line
: Behavior 0 is present on a continuation line. Although this condition is possible, continuation lines are usually added because more room is needed to record associations of a seal. Check that the animal is indeed unassociated.

Distance code missing
: No distance code is present. It should be added if available.

Line no appears twice in associations
: The same line number is in both associations A and B. This may happen if more than four behaviors are recorded. This message may also appear if association A was originally blank and the program inserted an association N or L identical to the one already in association B. In this case, the duplicate in association B will be removed in the next message.

Sector different from line nn
: The displayed line and line nn are linked by an association, yet the sectors coded are different. This message is displayed with any distance code if the sectors are not adjacent, or with a distance code of 0 or 1 if they are adjacent. Processing continues normally for the association.

Table 5.--Explanation of messages from the data verification program. Messages in group A indicate errors that must be corrected. Messages in group B indicate probable errors; these messages may remain even after the data have been edited.

A. Messages indicating an incorrect condition

A distance > 3 or not numeric
: Distance code must be 0, 1, 2, 3, or blank. This message is produced when any other character appears for the distance code in association A.

A line number > 64 or not numeric
: The line number appearing in association A of the entry shown is not within the permitted range of 1 to 64.

A or B line number cites current line
: The line number of one of the associations is the same as the line number on which the association itself is found.

Association time < begin time or > end time
: The association time must be between the begin and end times that appear on the page-header record.

Association time > 2400 or not numeric
: Time must be recorded as a number between 0001 and 2400, with minutes between 00 and 59.

B distance > 3 or not numeric
: Distance code must be 0, 1, 2, 3, or blank. This message is produced when any other character appears for the distance code in association B.

B line number > 64 or not numeric
: The line number appearing in association B of the entry shown is not within the permitted range of 1 to 64.

Beach position > 3 or not numeric
: Beach position must be 0, 1, 2, 3, or blank. Any other character will cause this message to appear.

Beginning time > 2400 or not numeric
: Time must be recorded as a number between 0001 and 2400, with minutes between 00 and 59.

Table 5.--Continued.

Behavior E mixed with other behavior No other behaviors should appear in an association reference with behavior E.
Behavior N by non-pup Behavior N should only appear in records where P appears as the first character of the size code, or if A appears as the first character of the size code and sex is coded as an F. Other combinations of size and sex should not be coded with behavior N.
Behavior O or X mixed with other behavior Behavior O indicates an unassociated seal, and behavior X indicates no data were recorded. Neither should be mixed with any other behavior codes.
Bleach ? code incorrect Bleach questionable should be blank, 0, 1, or 4 during initial checking. The standardization program adds a 2, 3, or 4 in the bleach questionable column when adding a bleach number. Refer to Table 7.
Cloud Cover > 10 or not numeric Cloud cover must be a number between 0 and 10, inclusive, or blank. Any other entry will cause this message to appear.
Continue line number equals line number The continuation line number should not be the same as the current line number on which it is entered. It should be the line number from which the current line is being continued.
Data Type not alphabetic Any alphabetic character is allowed, e.g., C (census) or P (patrol). A blank is not permitted. A list of data types present within the data set is printed at the bottom of the output.
Distance should be 0 for behavior B, M, or E These behaviors imply body contact, hence, a distance code of 0.
Distance should be 0 or 1 with behavior J Jousting cannot occur over a greater distance.
Disturbance > 3 or not numeric Disturbance must be 0, 1, 2, 3, or blank. Any other character will cause this message to appear.

Table 5.--Continued.

Ending time > 2400 or not numeric
: Time must be recorded as a number between 0001 and 2400, with minutes between 00 and 59.

Ending time earlier than beginning time
: You must have done this census very quickly.

First Page > Last Page or not numeric
: First page must be numeric and less than or equal to the page number of the last page.

For line 98 or 99, behavior L or E only
: If a line number in an association is either 98 or 99 (objects capable of entanglement), then the only behaviors allowed are E, L, or blank. Any other behavior codes with these line numbers will cause this message to appear.

ID ? = 0 indicates unidentified seal
: ID questionable coded as a zero indicates an unidentified seal, yet the ID field is not blank.

ID ? code incorrect
: ID questionable should be blank, 0, or 1 during initial checking. The standardization program adds a 2 or 3 in the ID questionable column when adding an ID number. Refer to Table 7.

Improper line no with E behavior
: If behavior E is coded in an association, the line number must be 98 or 99.

Improper size
: Size must be one of the established size codes defined by the census form directions (see Appendix F and Table 2). A blank is not permitted.

Invalid behavior code in A
: A behavior code different from those established as proper codes (see census form directions for current year) is present in association A.

Invalid behavior code in B
: A behavior code different from those established as proper codes (see census form directions for current year) is present in association B.

Table 5.--Continued.

Is identification certain or not?
: One of the types of identification (ID, bleach, or tag) indicates a positive identification of an animal, but another indicates uncertainty (? column = 1 or 5). Continuation lines should also not indicate uncertainty if the original line has a positive identification. Decide whether the identity of the seal was certain.

Island Code not valid
: Only island codes defined in Table 1 are allowed.

Island/weather/date or datatype inconsistent
: The date, island code, data type, and weather information must be the same on each page within a group of pages. Weather includes wind speed and direction, cloud cover, and precipitation codes.

Molt % not 0-100 or not numeric
: Molt percentage must be within the proper range of numeric values.

Molt ? = 0 indicates no molt
: Molt questionable coded as 0 indicates molting is not occurring, yet molt percentage is not blank.

Molt ? > 4 or not numeric
: Molt questionable is blank, 0, or 1 during initial checking. After molt observations have been checked and corrected with the haul chart and standardization programs, a 2, 3, or 4 may be in this column. Refer to Table 7.

Month not 1-12 or Day not within month
: Month must be numeric and within the proper range, and the day must not exceed the maximum possible for each month. February 29th is permitted for any year.

No of census/patrol > 100 or not numeric
: Census or patrol number should be within a reasonable range.

Note = R requires beach position = 0
: An R in the note column indicates that the seal was on an offshore rock. By convention, these seals are not counted as part of the census, so beach position must be recorded as 0.

Observer initial not alphabetic
: Observer identification should be alphabetic. If not, this message is printed. A list of observers is printed at the bottom of the output.

Table 5.--Continued.

Odd number of N behaviors on previous page
: There is an unpaired behavior code N on the page preceding the displayed record.

Precipitation > 3 or not numeric
: Precipitation must be 0, 1, 2, 3, or blank. Anything else will be flagged by this message.

Previous page sequence incomplete
: One or more pages of data in the group of pages preceding the displayed one are apparently missing. The pages in a group may appear in any order but must be together.

Record type not 1 or 2
: Any record included in the data without a record type 1 or 2 coded in column 80 will cause this message. Record type is generated automatically as the job level during data entry. No further checking is performed for this record.

Sex not M, F, or U
: Sex must be M, F, or U. Any other character will cause this message to appear. A blank is not permitted.

Source ID Code not RM009AB1
: Any type 1 (page-header) record must have the proper source ID code. This message may indicate that the wrong data type is being processed.

Tag ? = 0 indicates untagged seal
: Tag questionable coded as a zero indicates an untagged seal, yet tag number, tag position, and tag color are not all blank.

Tag ? = 5 implies partial tag sighting
: Tag questionable coded as a 5 indicates that some parts of a tag identification (tag number, position, or color) were seen, but not enough to identify the seal. If Tag ? = 5, then tag number, position, and color should not all be complete, nor should they all be blank. Table 7 explains the use of the tag questionable codes.

Tag ? code incorrect
: Tag questionable should be blank, 0, 1, 4, or 5 during initial checking. The standardization program adds a 2, 3, or 4 in the tag questionable column when adding a tag number. Refer to Table 7.

Table 5.--Continued.

Tag Identification incomplete
: This message is produced when some of the tag information, either tag number, color, or position is blank, and the seal is not identified via an ID or bleach number. If this is a continuation line of which the original line was a complete tag sighting, fill in the incompletely seen tag and put a 4 in the tag questionable column.

Tag position code not L, R, or B
: Tag position should be coded L, R, B, or blank. Any other character will cause this message to appear.

Temperature not 10-40 Celsius or not numeric
: Temperature must fall within a normal range of numeric values. The usual cause of this message is that temperature was recorded in degrees Fahrenheit.

Wind Direction improper
: Wind direction must be coded as one of the eight major cardinal directions (see Table 2). Appearance of any other character combinations will cause this message to be printed.

Wind Strength > 2 or not numeric
: Wind strength should be 0, 1, 2, or blank. Anything else will cause this message to be produced.

B. Messages indicating an unlikely but not necessarily incorrect condition

A line number or distance missing
: Both a line number and distance code should appear in association A. If one is blank and the other is not, this message will appear.

Association time appears out of order
: Association times normally appear in ascending order down the page. This message appears if an association time is earlier than a previous one, neglecting continuation lines.

B line number or distance missing
: Both a line number and distance code should appear in association B. If one is blank and the other is not, this message will appear.

Batch number is different
: Data from more than one batch are mixed in this file. The batch number of each type 1 record should normally be the same as the batch number established on the first record of the file.

Table 5.--Continued.

Begin or end time is out of range for Census
: If data type is C, begin times before 1100 and after 1500 and end times after 1800 are flagged with this message.

Begin time is out of range for Atoll count
: If data type is A, begin times before 0900 and after 1800 are flagged with this message.

Behavior M by non adult or subadult male
: Behavior M will usually appear only in records where size and sex indicate adult or subadult male seal. Any other combination of size and sex in conjunction with behavior M will cause this message to appear.

Census with no time reported
: If data type is C or A, then begin time should not be blank.

Continue line number > 39 or not numeric
: The line number used by a continuation line is limited to the numeric range of 1 to 39.

Island/atoll different from first record
: The island code appearing on this record indicates that data are from an island or atoll different from the island name appearing at the top of the printout, which is read from the first record of the file. This condition may indicate that the island code has been improperly entered or that data from different islands have become mixed.

Line no. appears twice in associations
: The same line number is repeated in associations A and B.

Line number > 64 or not numeric
: A line number greater than 64 is flagged as a possible error.

Line number out of sequence
: Line numbers within each page normally begin with 1 and increase consecutively. Any break in the line number sequence will be flagged with this message.

No nursing behavior for pup
: A record with a P coded in the size field will normally have behavior N in one of the associations. If not, this message will appear.

Table 5.--Continued.

Sector not valid for island	Sectors must be appropriate to the island coded on the page header for the page. See Table 1 for allowable sectors for each island. This message may be ignored only if additional sectors have been used to indicate temporary sand spits near a permanent island.
Year is incorrect	Year is usually the same throughout a file. Each page header should conform to the year established at the beginning of the file.

Table 6.--Explanation of messages from the ID list checking program. The ID list checking program looks for errors within the current ID list and between it and one or more previous ID lists. Messages in group A are errors or inconsistencies that must be corrected. Messages in group B indicate probable error conditions that should be checked. The notation "X" indicates where the computer would print the filename of an ID list, whereas "D" represents the record number in that file.

A. Messages indicating an incorrect condition

Birth or wean date for non-pup
: Birth and wean dates should be recorded on the ID list only for pups of the year (size P or W).

Duplicate tag in X, record n
: The displayed record from the current ID list and record n of file X have the same tag number and color but apparently refer to different seals because the ID numbers are different. Either a tag number or an ID number is in error.

Duplicate tag on record n
: Record n and the displayed record contain duplicate tags.

Improper ID number
: The ID number, if present, must have four characters, the first of which is a letter.

Improper sex
: The sex code must be M, F, or U.

Improper size
: The size code must be one of the codes specified in the census form directions.

Improper tag color
: Tag color must be G, K, M, B, T, R, or Y.

Improper tag position
: Tag position must be L or R.

Molt end date earlier than begin date
: The molt end date, if recorded, cannot be earlier than the molt begin date.

Nursing ID must refer to A F
: The seal listed as the nursing associate of a pup is not an adult female.

Table 6.--Continued.

Nursing ID present requires size P or W
: If a nursing ID is present, the size of the seal on that line must be P or W--that is, a pup born in the current year. The identities of mothers or nursing associates of seals born in previous years should not be recorded here, even if known.

New ID also in X, record n
: The ID number of the displayed record is supposed to be a new ID number, but the same ID number occurs in file X, record n. Either the same ID number has been assigned to two different seals, or the seal is not really a new ID in the current year (in this case, change the "new ID?" code from 1 to blank).

Sex different in X, record n
: The displayed record from the current ID list and record n of file X refer to the same seal because they have the same ID number, but the sex of the seal given in the previous ID list X is different. The sex code may be in error, or the records may not really refer to the same seal.

Size larger in X, record n
: The displayed record from the current ID list and record n of file X refer to the same seal because they have the same ID number, but the size of the seal given in the previous ID list X is larger. The size classification may be in error, or the records may not really refer to the same seal.

Wean date earlier than birth date
: The weaning date for a pup, if recorded, cannot be earlier than the birth date.

B. Messages indicating an unlikely but not necessarily incorrect condition

Duplicate ID on record n
: Record n and the displayed record contain the same ID number. The same line may have been entered twice, or the same ID number may have been assigned to two different seals. Normally each line of the ID list should refer to a different seal, but one seal may have two different lines on the ID list if it was given two different bleach numbers during the field season or if it has more than three tags.

Nursing ID not on ID list
: If a nursing ID is known, that adult female would normally have been seen and be, therefore, in the data and on the ID list. If the nursing ID was reported by someone outside the MMES Program, however, that sighting may not be recorded in the data, and hence, the nursing ID may not appear on the ID list.

Table 6.--Continued.

Old ID not in any previous ID list	The ID number on the displayed record from the current ID list is marked as an old ID, yet it cannot be found on any of the previous ID lists. The ID may be incorrectly marked as an old ID (change the "new ID?" code to 1). If it really is an old ID number, it may not be found on previous lists because they are incomplete or were not run or because the seal is a migrant from another island.
Tag different in X, record n	The displayed record from the current ID list and record n of file X refer to the same seal because they have the same ID number, but the tag numbers are different. The two records may not really refer to the same seal, or if they do, tag numbers may have been incorrectly recorded, including a left-right reversal. If the seal has had a new tag added or has been retagged, there is no error, and the message is permitted to stand. After confirming that the message is due to retagging or the addition of a new tag, the message may be suppressed by entering a "2" in the "new ID?" column of the ID list (see directions for completing the ID list (Appendix G)).

Table 7.--Codes used in the "questionable" columns. For the tag, bleach, and ID columns, these codes indicate whether identification is certain or not and whether the identification was made in the field or filled in later as a result of other information. For the molt column, these codes may, if present, indicate a certain molt condition despite an estimated percentage molt to the contrary. The molt questionable codes are also explained near the end of Appendix B.

Code in ID ?, bleach ?, or tag ? columns on census form	Meaning
(blank)	1) If an ID, bleach, or tag number is entered, the seal is a known animal with that identifier. If a partial bleach or tag number is entered, but the ID is known, the partial bleach or tag information given is certain. 2) If there is no entry in the number column, no data were recorded. There is no implication that the seal had an ID number or not, was bleached or not, or was tagged or not. It simply means no data were taken.
0	The seal has definitely not been assigned a permanent ID number (been IDed), does not have a bleach number, or does not have a tag. An entry of 0 implies that the observer had a good view of the seal and would have recorded a tag (or ID or bleach) number if one had been present.
1	The seal is IDed, bleached, or tagged, but the seal cannot be identified for certain. This code could be used if, for example, the observer saw that a tag was present but was not sure whether the number was read correctly. Any partial data in the number field is uncertain (compare use of code 5--see below).
2	The ID, bleach, or tag number has been filled in by the standardization program by referring to the ID list. In other words, this mode of identification was not on the original data sheet, but the computer added this number based on a recorded ID, bleach, or tag number.
3	The ID, bleach, or tag number has been filled in by the standardization program as a result of the seal being part of a mother-pup nursing pair. As with code 2, this mode of identification was not on the original data sheet, but added by computer because of the nursing association.

Table 7.--Continued.

Code in ID ?, bleach ?, or tag ? columns on census form	Meaning
4	This code applies to bleach and tag numbers but not ID numbers. It means that a bleach or tag number was present on the seal, but the number could not be read for certain, as in code 1; however, the seal is a known seal based on some other form of identification or based on the partial information given, and the bleach or tag number has been filled in, either manually or by the standardization program. This code may be used if enough of the original tag was read for the number to be determined unambiguously, or if the identity of the seal was deduced in some other way, such as scars, temporary bleach marks, or molt condition. The use of this code serves to distinguish the presence of bleach or tag numbers in the data not seen in the field but added by computer (codes 2 and 3) from the case where the bleach or tag was known to be present, yet only partially seen and the number deduced from other information.
5	This code applies to tag numbers but not ID or bleach numbers. It means that a tag was present on the seal but could not be read completely, and the seal's identity is, therefore, unknown, as in code = 1; however, portions of the tag's number, position, and color could be determined with certainty, and this certain partial information is recorded. For example, the tag entry A__LGS means that, although the identity of the seal is not known, it was tagged in 1983 (A) on the left flipper (L) at Lisianski (G); an entry of A__LG1 means that this island, year, and tag position information is uncertain.

Table 7.--Continued.

Code in molt ? column	Meaning
(blank)	1) If an estimate of molt percentage is entered, the observer is confident of that estimate. 2) If no estimate of molt percentage is entered, no data were recorded. There is no implication that the seal was molting or not. It simply means no data were taken.
0	The seal is definitely <u>not</u> molting. An entry of 0 implies that the observer saw enough of the seal to be certain that molt was not occurring.
1	The molt percentage is between 1 and 100, but the estimate of molt percentage is uncertain. The observer may not have seen all sides of the seal, it may have been covered with sand, etc.
2	The seal is molting--that is, molt percentage has been determined to be between 10 and 100 on this date--despite the estimate of molt percentage to the contrary. This code is not used in the field; it is added during data checking to override the (incorrect) field estimate of molt percentage.
3	The seal has not yet begun to molt--that is, molt percentage has been determined to be less than or equal to 10 on this date--despite the estimate of molt percentage to the contrary. This code is not used in the field; it is added during data checking to override the (incorrect) field estimate of molt percentage.
4	The seal has completed its molt--that is, molt percentage has been determined to be 100 on this date--despite the estimate of molt percentage to the contrary. By convention, seals change from 100% molt to 0% on 1 January of each year. A seal that has completed its molt should be recorded as 100% molt for at least 30 d after completing the molt. This code is not used in the field; it is added during data checking to override the (incorrect) field estimate of molt percentage.

...e 8.--Explanation of messages from the standardization program. ...ages in group A indicate changes made to the data to conform to the ID ... and do not normally require corrective action. Messages in group B ...icate error conditions that must be corrected. Messages in group C ...icate that the change required to bring the data into conformity with ... ID list has not been made, because the nature of the change required ...icates a probable error. Messages in group B are flagged with an "*" ... an "c" is used to flag those in group C. Messages in group D flag ...ably but not necessarily incorrect conditions; these messages are left ...ified in the message area of the printout to aid in spotting them.

...essages indicating a change made to the data

...ach added from ID list
The bleach field of the entry has been copied from the ID list.

...ach has been right justified
The bleach number has been shifted to remove any blank columns on the right.

...dded from ID list
The ID field of the entry has been copied from the ID list.

...as been right justified
The ID number has been shifted to remove any blank columns on the right.

...en sex added
A U code for sex in the census data has been changed to either M or F to conform to the ID list.

...ter prefix added to ID
A letter prefix has been added as the first character of the ID number to make it a complete four-character code, and zeros have been added after it as necessary. The prefix added is determined from the island code given on the first record of the file.

...e standardized from line nn
ID, bleach, and/or tag information has been copied from line nn to this pup's continuation line.

... changed
The size coded in an entry has been changed to conform to the ID list.

Table 8.--Continued.

Tag added from ID list
: Information in the tag field (number, position, and/or color) of the entry has been copied from the ID list. When tag information is added, it is taken from the first (leftmost) nonblank tag column in the ID list.

Tag number has been right justified
: The tag number has been shifted to remove any blank columns on the right.

B. Messages indicating an incorrect condition

Continue reference not within page
: The continuation line number of this pup's record is beyond the last line of the page.

***** Duplicate line no discarded *****
: Two records with the same line number have been found within one page. The first line is retained and processing continues, while the second line with the same number is not copied to the output data set.

ID or bleach mismatches ID list
: Some of the census data do not match the corresponding data in the ID list. For example, ID number may match but bleach number does not. The error could exist either in the census data or ID list.

ID, bleach, or tag not on ID list
: The displayed data line contains an ID, bleach, or tag number that does not exist on the ID list. This message means a search of the list has been unsuccessful. The error may exist either in the census data or the ID list.

***** Invalid line no discarded *****
: The program presently has a capacity of 64 lines per page. Line numbers greater than 64 will not be copied to the output file.

Is identification certain or not?
: A definitely identified seal has been matched on the ID list, but another type of identification (ID, bleach, or tag) is coded as questionable in the data (? column = 1 or 5).

Table 8.--Continued.

Molt dates needed on ID list
: A special code (2, 3, or 4) indicating molt condition is present in the molt questionable column, yet there are no molt dates given on the ID list. Molt begin and end dates should be added to the ID list so the standardization program can check the consistency of molt sightings. Alternatively, if no molt information exists, the message indicates that molt questionable has been coded in error.

Molt percentage not 0 - 100
: Estimated percentage molt is not in the proper range of values.

Molt questionable code in error
: The special code used in the molt questionable column to indicate molt condition does not agree with the molt dates given on the ID list. The molt questionable codes and their meanings are as follows: 2 = molting is occurring (observation date on or after molt begin date but before molt end date); 3 = molt has not yet begun (observation date before molt begin date); 4 = molt has been completed (observation date on or after molt end date). See Table 7. Check the date of this observation against the molt begin and end dates on the ID list to resolve the inconsistency.

Molt > 10 before molt begin date
: This record's sighting date, determined from the page header, is earlier than the begin date of molting given on the ID list, yet the molt entry of this record is >10%. Molt should be $\leq$10% before the begin date of molting. If the molt percentage is correct, change the molt begin date on the ID list to the date of this record or earlier; if you believe the estimate of percent molt is incorrect, put a 3 in the molt questionable column. A 3 means that molting is not yet occurring despite the recorded estimate of percent molt (cf. Table 7). The estimated molt percentage is not normally changed.

Molt should be >10 or <100 during molt
: This record's sighting date, determined from the page header, is between the begin and end dates of molting given on the ID list, yet the molt entry in the data is not greater than 10 or <100%. By definition, molt percentage should be between these limits during the molting period. If the molt percentage is correct, change the molt begin or end date on the ID list; if you believe the estimate of percent molt is incorrect, put a 2 in the molt questionable column. A 2 means that molting is occurring despite the recorded estimate of percent molt (cf. Table 7). The estimated molt percentage is not normally changed.

Table 8.--Continued.

Molt <100 on or after molt end date
: This record's sighting date, determined from the page header, is equal to or later than the end date of molting given on the ID list, yet the molt entry in the data is >100%. Molt percentage should be recorded as 100 for at least 1 mo after the end date of molting. If the molt percentage is correct, change the molt end date on the ID list to a date later than the date of this record; if you believe the estimate of percent molt is incorrect, put a 4 in the molt questionable column. A 4 means that molting is complete despite the estimate of percent molt (cf. Table 7). The estimated molt percentage is not normally changed. This message is suppressed for pups of the year.

Pup has different nurse in data & ID list
: The nursing ID given on the ID list for this pup does not match the identity of the adult female linked to the pup by a nursing association in the data.

Sighting date earlier than birth date
: This record's sighting date, determined from the page header, is earlier than the birth date given on the ID list. The error may be in either the census data or the ID list.

Size, Sex or ID doesn't match line nn
: The size, sex, ID number, or bleach number of a pup's continuation line does not match the primary line nn.

Size should be P before wean date
: This record's sighting date, determined from the page header, is earlier than the wean date given on the ID list. Size must be coded as P (or P1-P5) before the wean date. The error may be in either the data or the ID list.

Size should be W or PW after wean date
: This record's sighting date, determined from the page header, is equal to or later than the wean date given on the ID list. Size must be coded as W or PW on or after the date of weaning. The error may be in either the data or the ID list.

Source ID code should be RM009AB1
: Each type 1 (page-header) record must have the proper source ID code. This message usually indicates that the output file of a previous run of the standardization program is being processed as input. The program should be rerun with the proper input file.

Table 8.--Continued.

Tag doesn't match ID list
: The tag coded in the census data cannot be matched with any of the tags in the ID list. The problem may be in the tag number, tag color, or tag position in either the census data or ID list.

*** Unexpected record type discarded **
: A record has been detected that does not have a 1 or 2 coded in position 80, indicating perhaps that the wrong data are being used or that something happened to the original data. This record, like a blank or deleted record, will not be copied to the output data set.

C. Messages indicating an unlikely change to the data is required

Change of sex required
: A change of sex from M to F or from F to M would be required to bring the data into conformity with the ID list. This message indicates that, in the field, the seal was incorrectly sexed or incorrectly identified or, if the message occurs frequently with the same animal, that sex is incorrectly coded on the ID list.

Unlikely size change required
: An unlikely change of size in the data would be required to bring the data into conformity with the ID list. These unlikely size changes are J to A, A to J, P or W to anything else, and anything else to P or W. This message indicates that, in the field, the seal was badly missized or incorrectly identified, or, if the message occurs frequently with the same animal, that size is incorrectly entered on the ID list.

D. Messages indicating an unlikely but not necessarily incorrect condition

IDed seal with unknown sex
: The ID list contains something other than M or F as a sex code for the entry being used to standardize a record in the data.

IDed seal with unknown size
: The ID list contains U as a size code for the entry being used to standardize a record in the data.

Line may not be standardized
: A pup's continuation line occurs before its primary reference line, so any standardization of that primary line will not be transferred to this continuation line. Standardization of the displayed line may have to be done manually.

Table 8.--Continued.

No nursing behavior for pup	A pup's record does not have behavior N. Standardizing its size, sex, and identification may not be possible because this pup is not linked to a mother via a nursing association.
Pup doesn't have nursing ID on ID list	A pup is linked to a known adult female via a nursing association, yet on the ID list, the pup's nursing ID entry is blank.
Tag color mismatches ID prefix	The letter prefix added to the ID number does not match tag color. Usually the two codes are the same letter. Thus, this message indicates that the ID letter prefix may have been added in error.
Unique tag cannot be determined	The standardization program cannot fill in the missing tag number on this line because a suitable unique tag number could not be determined from the tag information on the ID list. The tag number on this line should be filled in manually if possible.

Table 9.--Skeleton Job Control Language (JCL) to combine, reformat, sort, and renumber monk seal data files. The lower case "o" indicates where the job-specific numbers or names should be filled in. Reformatting to a homogeneous record type is accomplished by RM009T02, sorting by the IBM system utility SYNCSORT, and renumbering and other final steps by RM009T03. Completion codes passed to the IBM system should be a 0 for each job step if the various programs have run successfully. The card images are stored on the Mohawk system as RM009T01.

//oooooo JOB (oooo,10S,9KI),oooo,COND=(0,NE)

The first card image presented to the JES2 system is a JOB card with a job name (usually the "core" of the name of the file being created, like "LAY85C", following the format IIIYYT). The account number needs to be specified, as well as resource allocation parameters characteristic to each particular run. For example, if a great number of sightings will have data type changed to "I," the implicit default value of 2KL may not be enough, as each change made to the data requires two lines to be printed. Similarly, very large data sets may require more time or i/o count. The programmer's name appears next on the JOB card. The last parameter prevents execution of subsequent job steps if any step ends abnormally, that is, returns a completion code other than zero.

//JOBLIB DD DSN=TO10760.RM009LIB,DISP=SHR

The second card image defines the load module library containing the executable form of two routines, RM009T02 and RM009T03. These programs combine record types 1 and 2 into a single homogeneous format, and renumber the final data set after sorting.

// EXEC SETUP

The third card image allocates physical units for magnetic tape, signaling the operator to mount specified volumes, usually when final output (RM009AC1) is directed to tape or when some or all input files are stored on tape. If tapes are not used, this entire job step (this and the following two lines) should be omitted.

V=oooooo,SZ=o,RING

This is input to the tape setup program, conveying tape number, reel size, and whether a write-enable hub ring is to be in place. Usually the tape to be written is specified first.

V=oooooo,SZ=o,NORING

This continues input to the tape setup program and indicates a volume containing input data sets (treated as read-only). If all input data for the run are being transmitted directly from the Mohawk system, this line should be omitted.

Table 9.--Continued.

```
//  EXEC  PGM=RM009T02
```

This JCL statement invokes the monk seal formatting routine to combine two different types of records, type 1 (information from the top of the census form like island, observer, time and date, data type, number of census or patrol, weather conditions, and batch number) and type 2 (information from the lines of the census form like line number, sector, size, ID, bleach, tag, beach position, molt, disturbance, time, and associations) into a single record having a homogeneous format and sequence numbering with a total length of 120 characters. If a type 1 record follows directly after another type 1 record with no intervening type 2 records, blanks are substituted where the information from a type 2 record would normally appear, so that no information is lost during the formatting process.

```
//SYSOPT  DD  *
NORMAL RUN
```

```
//SYSOPT  DD  *
NO ID CHK
```

These two card images define an option file used by the formatting program to indicate whether standardized or unstandardized data are being used. If the first nine characters of the SYSOPT file are "NO ID CHK", the source ID code is not checked and prestandardized data may be used. In that case, the last //SYSOUT command should be changed so that no file is written to tape. If the first nine characters of the SYSOPT file are anything other than "NO ID CHK", the program will accept data with source ID code RM009AC1 (poststandardized data) only.

```
//SYSPRINT  DD  SYSOUT=A
```

Defining SYSPRINT enables the monk seal formatting routine to write messages to the system output device, where they will appear along with other printed output generated during the run. Depending on options coded on the job card, how the job is submitted and controlled by the job entry subsystem, this print file may be routed to Mohawk or IBM systems, where it may be either spooled onto disk or produced in hard-copy form.

Table 9.--Continued.

```
//SYSIN  DD  DISP=SHR,UNIT=XTRK,VOL=SER=oooooo,          //SYSIN  DD  *
//     LABEL=(ooo,SL),DSN=oooooooo                        <data deck>
//        DD  DISP=SHR,UNIT=XTRK,VOL=SER=oooooo,
//     LABEL=(ooo,SL),DSN=oooooooo
//        DD  DISP=SHR,UNIT=XTRK,VOL=SER=oooooo,
//     LABEL=(ooo,SL),DSN=oooooooo
```

The six lines on the left show how three separate data sets on tape may be concatenated within one data definition statement as is often done when combining standardized monk seal census data sets. Note that the tape volume serial number, the logical file number, and the name of the data set must be specified. The line on the right shows how input data residing on the Mohawk system may be embedded in the job stream. Following the rules for coding data definition statements, these techniques may be combined, and conceivably, data could be brought from any type of device or combination of devices.

```
//SYSOUT  DD  DSN=&&TEMP,DISP=(NEW,PASS),
//     UNIT=SYSDA,SPACE=(CYL,(1,1)),
//     DCB=(RECFM=FB,LRECL=120,BLKSIZE=9000)
```

These lines define the output data set generated by the monk seal formatting routine. In this example, a temporary data set is allocated on one of the IBM 3380 disk drives. Space is allocated by cylinders to match the attributes expected by the system sort, which will follow. The data control block specification reflects the record length of the formatted output, and optimum blocking factor for the 3380 drive.

```
//SYSNUM  DD  DSN=&&NUM,DISP=(NEW,PASS),
//     UNIT=SYSDA,SPACE=(TRK,(1,1)),
//     DCB=(RECFM=FB,LRECL=80,BLKSIZE=9040)
```

These lines define a temporary data set used to contain the count of output records written to the SYSOUT file. This number will be checked later by the renumbering routine to ensure that the same number of records are written to the final sorted output file.

```
//  EXEC  SORT
```

This statement invokes SYNCSORT on the IBM system to sort the formatted monk seal data according to requirements developed for census data.

Table 9.--Continued.

```
//SORTIN   DD  DSN=&&TEMP,UNIT=SYSDA,DISP=(OLD,PASS)
```

This statement defines the input to the sort as the temporary data set created in the previous job step by the formatting routine.

```
//SORTOUT  DD  DSN=&&TEMP1,DISP=(NEW,PASS),
//     UNIT=SYSDA,SPACE=(CYL,(1,1)),
//     DCB=(RECFM=FB,LRECL=120,BLKSIZE=9000)
```

This statement allocates a temporary data set to contain the sorted census data. This data set will be held until the noncensus data are sorted and the two groups of data are merged.

```
//SYSIN DD *
 SORT FIELDS=(24,6,CH,A,30,1,CH,A,9,2,CH,A,31,3,CH,A,
             22,1,CH,A,42,2,CH,A),EQUALS
 INCLUDE COND=(30,1,CH,EQ,C'A',OR,30,1,CH,EQ,C'C')
```

This group of card images controls the sort, specifying both the sort key used when comparing records (i.e., observation date, data type, island, number of census or atoll count, and page and line number) and what records are selected for processing (i.e., those containing an A or C in column 30). The key word "EQUALS" means that records with identical sort keys are to remain in the same order as found in the input file.

```
//   EXEC  SORT
```

This statement invokes SYNCSORT on the second stage of the sort, involving noncensus data not included in the previous step.

```
//SORTIN   DD  DSN=&&TEMP,UNIT=SYSDA,DISP=(OLD,PASS)
```

This statement defines input to the sort as the same temporary data set created by the formatting routine that was used in the first stage of the sort.

```
//SORTOUT  DD  DSN=&&TEMP2,DISP=(NEW,PASS),
//     UNIT=SYSDA,SPACE=(CYL,(1,1)),
//     DCB=(RECFM=FB,LRECL=120,BLKSIZE=9000)
```

This statement defines a temporary data set to contain the sorted noncensus data that will eventually be merged with the census data.

Table 9.--Continued.

```
//SYSIN DD *
 SORT FIELDS=(24,6,CH,A,30,1,CH,A,9,2,CH,A,31,3,CH,A,
              14,4,CH,A,11,3,CH,A,22,1,CH,A,42,2,CH,A),EQUALS
 OMIT COND=(30,1,CH,EQ,C'A',OR,30,1,CH,EQ,C'C')
```

This group of card images specifies both the sort key used when comparing records (i.e., observation date, data type, island, number of patrol, time begin, observer, and page and line number) and the records to omit from processing (i.e., those records containing an A or C in column 30).

```
//  EXEC  SORT
```

This statement invokes SYNCSORT again for the third stage of the sort, when the two groups of previously sorted records are merged together.

```
//SORTIN01  DD  UNIT=SYSDA,DSN=&&TEMP2,DISP=(OLD,DELETE)
//SORTIN02  DD  UNIT=SYSDA,DSN=&&TEMP1,DISP=(OLD,DELETE)
```

These two data definition statements enable SYNCSORT to access the two temporary data sets containing the sorted census and noncensus data.

```
 //SORTOUT  DD  DSN=&&TEMP3,DISP=(NEW,PASS),
//    UNIT=SYSDA,SPACE=(CYL,(1,1)),
//    DCB=(RECFM=FB,LRECL=120,BLKSIZE=9000)
```

This statement allocates a temporary data set to contain the sorted and merged data ready for renumbering.

```
//SYSIN DD *
 MERGE FIELDS=(24,6,CH,A,30,1,CH,A,9,2,CH,A,31,3,CH,A),EQUALS
```

This pair of card images specifies the key used when merging data sets (i.e., observation date, data type, island, and number of census or patrol).

Table 9.--Continued.

```
//  EXEC  PGM=RM009T03
```

This statement invokes the monk seal renumbering routine to consecutively number the data records because sorting may have disturbed the original order established during formatting. If the notes column of a data record contains an L, the data type of the record is changed to an I, and a message is printed to document the change made to the data. The completeness of all atoll counts (data type A) is also checked. When processing is completed, a message is printed, and the last record produced is shown. If the number of records produced differs from the number of records formatted, an error message is produced.

```
//SYSPRINT  DD  SYSOUT=A
```

Defining SYSPRINT enables the monk seal renumbering routine to write messages to the system output device, appearing with other printed output generated during the run.

```
//SYSIN  DD  UNIT=SYSDA,DSN=&&TEMP3,DISP=(OLD,DELETE)
```

This statement defines the input to the renumbering routine as the sorted and merged data set created in the previous job step.

```
//SYSNUM  DD  DSN=&&NUM,DISP=SHR
```

This statement enables the renumbering routine to access the record count generated by the formatting routine, so any variance between the number of records produced and the number of records originally formatted can be flagged by a printed error message.

```
//SYSOUT  DD  UNIT=XTRK,VOL=SER=oooooo,                    //SYSOUT DD DUMMY
//    LABEL=(oo,SL),DSN='RM009AC1.oooooo',
//    DCB=(RECFM=FB,LRECL=120,BLKSIZE=12000,DEN=3)
```

The output of the renumbering routine is directed to the tape volume on which it will reside. The volume serial number, logical file number, and name of the data set must be completed. Modifying this statement could direct the output to any other device desired. See the section "Program Documentation and Data Storage" for data set naming rules. Note that the blocking factor is optimized for tape and that density 3 (1600bpi) is specified. The card image on the right specifies dummy output and suppresses writing to tape. This should be used if the NO ID CHK option is used with the //SYSOPT command.

Table 10.--Data format for monk seal census data (source ID RM009AC1).

Column	Total	Item description
1-8	8	Source ID (RM009AC1)
9-10	2	Island code
11-13	3	Observer
14-17	4	Time begin
18-21	4	Time end
22	1	First page
23	1	Last page
24-25	2	Year
26-27	2	Month
28-29	2	Day
30	1	Data type
31-33	3	Number of census or patrol
34-35	2	Temperature
36	1	Wind strength
37-38	2	Wind direction
39-40	2	Cloud cover
41	1	Precipitation
42-43	2	Line number
44-45	2	Sector
46-47	2	Size
48	1	Sex
49-52	4	ID number
53	1	ID questionable
54-57	4	Bleach number
58	1	Bleach questionable
59-63	5	Tag number
64	1	Tag position
65	1	Tag color
66	1	Tag questionable
67	1	Beach position
68-70	3	Molt percentage
71	1	Molt questionable
72	1	Disturbance
73-76	4	Association time
77-78	2	Association A line number
79	1	Association A distance
80-87	8	Association A behaviors
88-89	2	Association B line number
90	1	Association B distance
91-98	8	Association B behaviors
99-100	2	Continuation line number
101	1	Notes flag
102-106	5	Blank
107-112	6	Batch number
113-120	8	Sequence number

Table 11.--Data format for output of the short reformatting program (source ID RM009M07).

Column	Total	Item description
1-2	2	Island code
3-8	6	Date (year, month, day)
9	1	Data type
10-11	2	Line number
12-13	2	Sector
14-15	2	Size
16	1	Sex
17-20	4	ID number
21	1	ID questionable
22-25	4	Bleach number
26	1	Bleach questionable
27-31	5	Tag number
32	1	Tag position
33	1	Tag color
34	1	Tag questionable
35	1	Beach position
36-38	3	Molt percentage
39	1	Molt questionable
40	1	Disturbance
41-44	4	Time
45-55	11	Association A
56-66	11	Association B
67-68	2	Continuation line number
69	1	Notes flag
70-79	10	Blank
80	1	Asterisk

APPENDIXES

BLANK PAGE 56

Appendix A.--Components of monk seal census data checking system.

I. Census data

A. Census forms (original data sheets--Form HL-0118)

1. Grouped by island and submitted to DMTS for entry

2. Broken into conveniently sized batches by DMTS

3. Entered and verified on Mohawk via standard DMTS procedures

4. Raw data sheets stored by MMES in notebooks after entry

5. MMES maintains indices of files by batch no. (BATCHNDX.DOC) and island and year (ISLYRNDX.DOC).

B. Entry format

1. Entry stage on permanent tape (RM009AA1)

DMTS maintains index of files by tape volume (TAPELIST) and source ID code (DATAFILE) as well as cataloging all data sets in the mainframe IBM system catalog. "Tape data sets" document is prepared for DMTS binder and distributed to MMES group to ensure uniformity in descriptive name. Docutape documentation results are posted in MMES alcove in DMTS area whenever files are written to tape to prevent later overwriting of data.

2. Editing stage on Mohawk fixed disk; identified by batch ID and version (alphabetic suffix) or island, year, and data type

MMES procedures--versions produced by association checking or standardization programs, or imported from IBM system. Documented by data status form (Form HL-0146) within folder provided by MMES group. All output during editing stage stored by batch number with MMES to preserve record of editing changes. As desired, data are backed up on MMES working and archival tapes (docutapes posted in MMES alcove in DMTS area).

Appendix A.--Continued.

3. Editing completed on permanent tape (RM009AB1)

DMTS maintains index of files by tape volume (TAPELIST) and source ID code (DATAFILE) as well as cataloging all data sets in the mainframe IBM system catalog. "Tape data sets" document is prepared for DMTS binder and distributed to MMES group to ensure uniformity in descriptive name. Docutape documentation results are posted in MMES alcove in DMTS area whenever files are written to tape to prevent later overwriting of data. Data status forms for each batch are stored by MMES in notebook.

C. Short format

1. File formatted into 80-column, homogeneous records

DMTS standard procedure; utilizing special, short reformatting program (RM009M07), coordinated with system manager of target system, and MMES group notified on completion of transfer operation.

D. Final format

1. Batches combined, formatted into 120-column, homogeneous records, and sorted; identified by island, year, and data type on permanent tape (RM009AC1)

DMTS maintains index of files by tape volume (TAPELIST) and source ID code (DATAFILE) as well as cataloging all data sets in the IBM mainframe system catalog. "Tape data sets" document is prepared for DMTS binder and distributed to MMES group to ensure uniformity in descriptive name. Docutape documentation results are posted in MMES alcove in DMTS area whenever files are written to tape to prevent later writing of data. Job output from the data transfer operation invoked by RM009T01 and a final listing of the data set are stored by island name and year with MMES.

2. Transfer from tape to other systems (IBM/PC, Molecular, or IBM mainframe)

DMTS standard procedures; coordinated with system manager of target system, and MMES group notified on completion of transfer operation.

Appendix A.--Continued.

3. Reverse format procedure to return to entry format

DMTS standard procedure; utilizing special reverse formatting program (RM009T04), coordinated with system manager of target system, and MMES group notified on completion of transfer operation.

II. ID list data

A. Entry

1. Form HL-0147 completed by MMES

2. Entered and verified on Mohawk via standard DMTS procedures

3. Original ID lists stored by MMES in notebooks

B. Editing

1. Sequence numbers added by ID list formatting program

2. Checked with the ID list checking program

3. Used with haul chart and standardization programs

All output during editing stage stored by batch number with MMES to preserve record of editing changes.

C. Final format

1. File on permanent tape (RM015AB1)

DMTS maintains index of files by tape volume (TAPELIST) and source ID code (DATAFILE) as well as cataloging all data sets in the IBM mainframe system catalog. "Tape data sets" document is prepared for DMTS binder and distributed to MMES group to ensure uniformity in descriptive name. Docutape tape documentation results are posted in MMES alcove in DMTS area whenever files are written to tape to prevent later overwriting of data.

2. File on flexible diskette(s); labeled and stored with other diskettes in MMES alcove in DMTS area

3. Current listings stored with MMES in notebook

Appendix A.--Continued.

4. Subsequent changes to ID list

Any later changes to the ID list are recorded on Form HL-0161. Such changes will require writing new tape and diskette files as well as updating TAPELIST and DATAFILE. Such changes will usually also require that the standardization program be run again on prestandardization batches of data (RM009AB1 files).

III. Programs

A. Mohawk system

1. Mohawk system programs supplied by Mohawk Data Systems

a. EDEDSK--extended data entry disk; used for entry and keystroke verification of census data forms onto system, and editing
b. MEDIAU--media utility; used to copy data or programs between disk, diskette, or printer
c. DISKU--disk utility; used to manage the volume table of contents (VTOC) for the fixed disk; needed to create, or delete files, and determine amount of free space
d. DSKETTEU--diskette utility; used to manage files on flexible diskette
e. PRINTERU--printer utility; used to modify printer attributes or advance paper
f. HASP--communications; used with job entry subsystem for link with IBM mainframe
g. SORTM--sort; used to sort monk seal sightings when producing a sighting list
h. KYSOURCE--editor; used mostly to edit program source code but can also be used on data
i. MOBOL2--compiler; used to translate source code into executable form
j. MOBOLMON--monitor; used to debug programs by displaying data, variables, and flow of control during execution

2. Screens (job definitions) for data entry or editing

a. RM009C01--for entering original monk seal data (RM009AA1
b. RM009C02--for editing monk seal data (RM009AB1)
c. RM015AB1--for entering monk seal ID lists (RM015AB1)

Appendix A.--Continued.

3. Executable code related to monk seal census data checking

   a. RM009X01--association checking
   b. RM009X02--data listing
   c. RM009X03--data verification
   d. RM009X04--sighting extraction
   e. RM009X05--sighting listing
   f. RM009X06--standardization
   g. RM009X07--short reformatting
   h. RM009X08--multiple ID or bleach replacement
   i. RM009X09--haul chart

4. MOBOL source code for above programs (RM009M01-RM009M09)

5. JCL stubs stored on Mohawk

   a. RM009T01--combining, reformatting, and sorting (Table 9)
   b. RM009JCL--data management (Appendix I)

B. University of Hawaii IBM System

1. PL/1 load modules related to monk seal data checking

   a. RM009T02--reformatting
   b. RM009T03--renumbering
   c. RM009T04--reverse formatting

2. PL/1 source code for above programs (RM009T02-RM009T04)

3. JCL stubs stored on IBM

IV. Documentation

A. Monk seal data correction system

1. This manual of checking procedures, including

   a. Guide to checking data (Appendix B)
   b. Guide to running checking programs (Appendix C)
   c. General descriptions of all programs
   d. Tables explaining error messages (Tables 4, 5, 6, and 8)
   e. Data format definitions (Tables 2, 3, 10, and 11)
   f. Descriptions of source code subprogram modules (Appendix J)
   g. Guide to transfer operations (Appendix I)
   h. DMTS checklists (Appendix K)

Appendix A.--Continued.

2. Examples of previous runs

3. General instructions for Mohawk

4. Source code of checking programs with DMTS

B. Permanent tapes

1. MMES-maintained indices of files by batch number (BATCHNDX.DOC) and island and year (ISLYRNDX.DOC).

2. DMTS-maintained documentation: standard procedure

3. Current docutape tape documentation program results; posted in MMES alcove in DMTS area

V. Homo sapiens, pinnipedis, et computeralis

A. Members of the MMES Program

File and maintain original census forms, ID lists, data status forms, data listings, and checking program output; initiate checking, correcting, or transfer of monk seal data; make all decisions on editing changes; and decide the status of data at each stage of processing.

B. Members of DMTS

Enter, edit, and maintain data files and checking programs, including proper documentation; run checking programs on Mohawk as requested; transfer data between systems; and generally assist in program development or other requirements the MMES group may have.

VI. Hardware

A. The Mohawk system unit, work stations, and printer

Main processing resource used for entering and editing data, running monk seal census data checking programs, and transferring data by use of a high-speed link.

Appendix A.--Continued.

B.	Communication lines and associated modems
	Transmission paths for monk seal census data between several computer systems, including the Molecular system.
C.	University of Hawaii's IBM system, including tape drives and line printers
	Supports permanent tapes, sorting, formatting and reverse formatting programs; provides high performance storage and rapid print out of large data sets.

Appendix B.--A guide for checking and correcting monk seal census data.

This guide outlines the general procedure for converting the raw census forms you filled out in the field to a computerized data file. The data must be entered on the computer, checked for various kinds of errors, and corrected when errors are found. Because of the amount of data, the checking itself will be done largely by computer. Several special purpose computer programs have been written to detect possible errors in the data. It is then up to you to decide whether possible errors are real or not, and if they are, how they should be corrected. As the person most familiar with the data from your particular island, you are in the best position to determine which entries are correct and which are not.

Please read these directions carefully and follow them exactly; it will make the data checking process easier for everyone. The data goes through several stages of checking. The general scheme is shown in Figure 1. At each stage (except the first), you will receive the results of an error-checking program and decide whether the data need to be changed or not. Indicate what changes you think should be made on a listing of the data file.

The objective is to have the data entered on the computer and completely checked as soon as possible after you return from the field, so that summary statistics and other analyses can be produced for your report. The amount of time required for data checking and correcting depends on two main factors: how quickly you "turn around" the error listings at each stage, and how busy the data entry operators are when you first turn in your data sheets. The second factor is beyond your control, but to minimize this time, you are urged to carry out stage 1 as soon as possible, preferably while still in the field.

Stage 1: Data entry

The first step is to collect all the data sheets together, including both census and patrol data, and put the sheets in chronological order in a three-ring binder. Clearly label the binder with the island name and year. The data will be entered into the computer directly from the data sheets, but before this is done, the sheets should be carefully checked. To ensure uniformity among data files from different islands and different years, the data must meet certain format requirements. If you do not check the data at this stage, the computer will make you correct the data later! Making corrections is much easier now--before the data have been entered--than later on.

Appendix B.--Continued.

First, check each page to ensure all data entries are legible. At this stage, after the data have been collected in the field but before entry on the computer, make all changes on the data sheets in red. The heading data (e.g., island, date, observer initials) should be as complete as possible for each page. Consult the directions for completing the census form (Appendix F) if in doubt about which entries are permissible. Normally the minimum entry for each line on the data sheet is sector, size, sex, and beach position. Sector and beach position may be blank if there are no data, but size and sex may not be blank (enter "U" if size, sex, or both are unknown). ID, bleach, and tag numbers should be right justified without leading zeros. Partially read identification numbers can be included if a " ", "1", or "5" is entered in the questionable column. Each association field (A or B) should either be blank or have an O or X behavior code only, with line number and distance blank, or have a line number, a distance, and some behavior code present. For continuation lines, the entry in the continue column is the line number from which the present line is being continued. In general, be sure that the only marks in the boxes are those allowed by the census form directions--i.e., no question marks, dashes, arrows, and so on. Observations not fitting into any category on the census form can be accommodated by using the note column although, of course, the notes themselves will not be entered on the computer.

When the data sheets have been checked, turn in the notebook(s) for data entry on the computer.

Stage 2: Association checking

The data sheets will be returned to you (the marks in green are from the data entry operators), together with two computer printouts in a folder. One of the printouts is a data listing of your file as it currently exists on the computer; the other is the output of an association checking program, which filled in any incomplete continuation lines and any missing halves of nursing or location associations and checked the association data. On the association checking output, each line contains a line (called a record) of your data, followed by a message about that line. The messages are of three types. One informs you of any changes made to the data; you should check to ensure the changes are correct. The second type notifies you of errors in the association data that must be corrected. The third type flags improbable but not necessarily incorrect conditions. Table 4 explains the error messages of the association checking program. A sequential record number in the right-hand column of the association checking output allows you to find the line quickly in the data listing and on the original data sheets, and the error message should direct you to the problem within that line. Special "rulers" help you read each line of data. If you decide to make a change, clearly mark the change on the data listing (in any bright color) and on the original data sheets in orange.

Appendix B.--Continued.

When finished reviewing and resolving all association errors detected by the computer, write the date and ink color of your corrections in the space provided in the upper right-hand corner of the data listing. If records have been deleted or inserted, write the number of deletions or insertions at the top of the listing. Initial and date the appropriate line on the Data Status Form in the folder. Turn in the folder with the marked-up data listing for editing. The changes you have indicated on the data listing will be made, and then the same association checking program will be run again. Review the output to make sure the changes you indicated have been made. Pay particular attention to changes that involve deleting or inserting records, or moving entire records from one place to another. Check also the total number of records at the bottom of the association checking output to make sure no records have been lost. Indicate further corrections needed and resubmit the listing for editing. Continue the cycle until you are satisfied that no more corrections are needed at this stage. The only error messages remaining on the output should be those in group C of Table 4. Then you are ready for stage 3.

Stage 3: Data verification

You will again receive a computer printout listing records which seem to be incorrect in one way or another. To the right of each record is a message identifying what the computer thought was an error and a sequence number to help you find the record in the data listing. Errors detected at this stage are mostly entries not permitted by the data format--e.g., numbers where there should be letters, or times greater than 2400--as well as certain logical checks--e.g., a B (bite) behavior should have a distance code of 0. As before, decide whether the errors detected by the computer are real or not. Table 5 explains the error messages from the data verification program. If the data need to be changed, mark the changes on the data listing (in any color different from ones previously used) and on the original data sheets in orange. At the end of the printout are lists of the observers and the data types for this particular data set; check to be sure all initials and data types are correct.

When finished reviewing and resolving all errors of this kind, again initial and date the Data Status Form, and turn in the marked-up data listing for editing. The changes you have indicated on the data listing will be made and the data verification program will be run again. You review this output and continue the cycle until the only error messages remaining on the output are those in group B of Table 5.

Appendix B.--Continued.

Stage 4: ID list preparation

The next computer printout you will receive is an ID-sighting list, which contains a listing of all identified seals (whether by ID, bleach, or tag numbers), as the identifications are read by the computer. The printout shows the sighting history of each identified seal, giving its sighting date, its size and sex recorded on that date, and a sequence number to allow you to find the record quickly on your data listing. Keep in mind that, although computers may be fast, they are not very bright; therefore, the computer will think that a seal with bleach "bTF" is different from a seal with bleach "TFb", where "b" stands for blank in the three-column bleach number. Leading zeros as well as blanks are significant. Errors of this kind must be corrected. The same seal will be listed more than once if it is referred to one time by its ID number, another time by its bleach number. Questionable identifications (where you entered a check mark in the questionable column) are also shown. An asterisk after the sighting date alerts that the seal was recorded as being seen more than once on the same date. Molting and nursing conditions are indicated by "m" and "n", respectively.

With the help of this ID-sighting list, you should compile an ID list (Form HL-0147, Appendix H), a list giving the correspondences between ID, bleach, and tag numbers, and a standardized size and sex for each individual. On the ID list, each line should refer to one individual seal. The ID list should be a complete master list of all the identified seals seen on your island during the year. Identified or tagged seals not seen during the current year should not be on the list. Consult the ID list directions (Appendix G) for details on completing the form.

Check the ID-sighting list against your records and resolve all discrepancies. Indicate any data changes on the data listing as before and on the original data sheets in orange. It is not necessary to fill in or standardize the identifications in the data file. This will be done for you by the computer at the next stage. Turn in the marked-up data listing and the ID list. The ID list will be entered on the computer.

The accuracy of the ID list is important because it will be used as a reference list during standardization. You should check the ID computer listing when it is returned to you against your handwritten sheets to ensure all entries are correct. You will receive a printout of the ID list checking program. This program checks the "current" ID list for internal consistency and compares it to previous ID lists. Messages from the ID list checking program are explained in Table 6. Resolve any possible error conditions detected by the ID list checking program.

Appendix B.--Continued.

When a preliminary ID list has been completed, the haul chart program can be run. The haul chart allows you to check the consistency of sightings of each identified seal, particularly during molting and nursing. The haul chart program also produces a table of first and last sighting dates, and molt begin and end dates, for each identified seal. These dates should be checked to ensure they are reasonable and consistent with the molt dates given on the ID list. If molt dates are not on the ID list, molt dates extracted by the haul chart program should be added to the ID list so the ID list checking and standardization programs can perform consistency checks. In addition, the haul chart program flags as probable errors each seal whose molt is apparently lasting more than 15 d or whose molt or nursing sequence is not continuous. Seals not appearing in the data also are flagged because seals that were not seen should not be on the ID list.

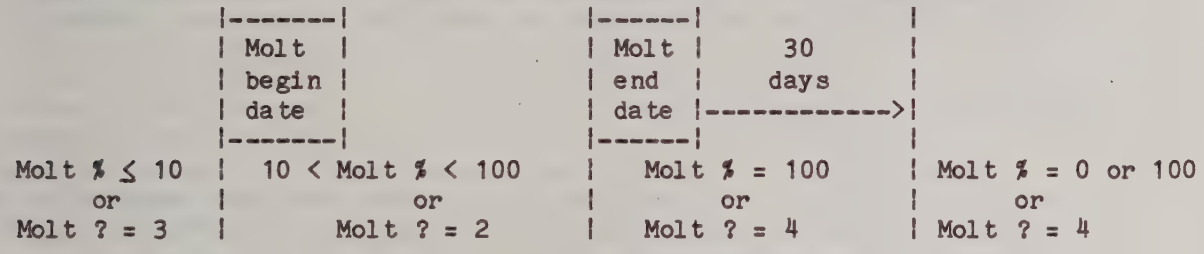
Stage 5: Standardization

Based on the information in the ID list, the computer will complete and standardize the identification fields, size, and sex of each known seal and add the identification numbers of nursing pups by association with the mother. You should check that these items have been done correctly. Table 8 explains the messages from the standardization program. Usually, the first run of the standardization program indicates some discrepancies between the data and the ID list. If there are any error messages produced by the standardization program (messages with an "*" or "o" following them), on the data listing, indicate the changes needed to correct the errors. Standardization of the data file is complete when no "*" or "o" is shown in the output messages of the standardization program.

Molt condition at each sighting is indicated either by the molt percentage estimate or by a special code in the molt questionable column. If you entered begin or end molt dates on the ID list, the standardization program checks the percentage molt estimate at each sighting for consistency with those dates. Inconsistencies are flagged with error messages. In response to such messages, you may have to override, by adding a special code in the molt questionable column, the percentage molt estimated in the field. A "2" means molting was occurring on this date (based on other sightings of the seal), although in this record molt percentage was not recorded or was recorded $\leq$10 or =100. A "3" indicates that molting was not yet occurring, although molt percentage was recorded >10. A "4" indicat molting was completed, although molt percentage was recorded <100. Table 7 explains the use of molt questionable codes in detail.

Appendix B.--Continued.

Indication of molt condition is summarized as follows:



Once a clean run of the standardization program has been achieved, the data should be correct. However, because editing may have introduced errors, another pass of the data through the association checking and verification programs should be made at this point. If the output messages are the same as the last run of each of these programs, the data are ready for the final stage.

Stage 6: Combining, reformatting, and sorting

The final stage is to combine the batches into one file, combine the header and line records, put all the records in chronological order, and perform some final checks. Examine the output to be sure the run proceeded normally. Any error messages should be self-explanatory. If everything looks okay, congratulations! You're all done! Return the original data notebooks and the folder containing all computer printouts to the central area.

Appendix C.--A guide for running monk seal data checking programs.

Note: Unless indicated otherwise, the printer must be assigned locally--i.e., not assigned to HASP--before running any of the programs below. When the program is finished, the printer should be reassigned to HASP.

Stage 1: Data entry

Use EDEDSK and Job Definition (screen) RM009C01 to enter and verify census data forms. The batch number is on the DMTS Data Submission Form received from MMES. Data are stored in original form (RM009AA1) on master and backup tapes maintained by DMTS.

Stage 2: Association checking

Use DISKU to create a data set label (record size 80) with batch number and suffix for a new version of the data created during a run. The naming convention for the data files is the batch number followed by a letter, which increases alphabetically each time a new version is created. For example, batch number D85039 becomes D85039A after the first run of the association checking program, D85039B after the second run, and so on.

Key "RM009X01" on Mohawk program select menu. Key names of input and output data sets, using SKIP to complete each. After program is finished, list output data set using RM009X02. Remove input data set using DISKU.

Stage 3: Data verification

Key "RM009X03" on program select menu. Key name of data set to be checked, using SKIP to complete it.

Stage 4: ID list preparation

(1) To produce an ID-sighting list

Use DISKU to create sighting file RM009SEL (record size 42), index file RM009NDX (record size 128), and work file WORKA (record size 27).

Key "RM009X04" on program select menu. Key name of input file (data set) and sighting output filename (RM009SEL). The sighting selection program will run, but no printed output will be produced. The printer does not have to be assigned to the Mohawk while this program is running.

Appendix C.--Continued.

When the program select menu reappears, select "SORTM". Choose the Sequential Index by pressing "3". Key input "RM009SEL", device "D", output "RM009NDX", device "D", "WORKA", device "D", then press ENTER. Key sort field (0, 24) by pressing "0", EXIT, "24", EXIT, then press EXIT 18 times to key "A" (Ascending) and "N" and press ENTER. Sorting will proceed. The printer does not have to be assigned to the Mohawk during sorting. When **FUNCTION COMPLETE** appears, press RESET, then "5" to sign off.

To print the ID-sighting list, key "RM009X05" on program select menu. Key sighting input file "RM009SEL" and index file "RM009NDX". When printing is complete and program select menu appears, use DISKU to delete selection file (RM009SEL), index file (RM009NDX), and work file (WORKA).

(2) To check the ID list

First add sequence numbers to the ID list if necessary. Use DISKU to create a new data set label (record size 80). The naming convention is to use the batch number with an A added to the end. Key "RM015X01" on program select menu. Key names of input and output ID lists, using SKIP to complete each. The ID list may be listed with RM009X02.

Key "RM015X02" on program select menu. Select "1" to check the current ID list for internal consistency only, "2" to check it against previous ID lists from the same island, or "3" to do both. Key in the name of the ID list to be checked and, if needed, any previous lists. The checking program will run, but no printed output will be produced. Assigning the printer to the Mohawk during the run is not required. When the run is complete, the program will prompt you to assign the printer, and the results of the ID list checking program will then be printed.

(3) To produce a haul chart

Use DISKU to create a data set label (record size 366) for the haul chart. Give the file a name that indicates the island and year, such as LIS85CHT.

Key "RM009X09" on program select menu. Select "1" to add more sightings to the haul chart or "2" to print the haul chart. If more sightings are to be added, key the names of the haul chart, ID list, and data set(s) to be run. The program can be run repeatedly using different batches to make a complete haul chart. The printer does not have to be assigned to the Mohawk while the haul chart program is adding sightings from a data file (option 1), but it must be assigned before printing the haul chart (option 2).

Appendix C.--Continued.

Stage 5: Standardization

Use DISKU to create a data set label (record size 80) for a new version of the data set created by the standardization program. Name the file by continuing the alphabetic series for the data set.

Key "RM009X06" on program select menu. Key input and output data sets, and ID list for the batch, using SKIP to complete each.

If any of the report messages from the standardization program contain an "*" or "o" symbol to the right, a change is required either in the data or ID list. In either case, delete the output data set using DISKU and correct the input data set or ID list. When the standardization program gives no messages with an error symbol, standardization of the data is complete. The input data set should be saved permanently on tape with source ID RM009AB1, while the output data set is ready for stage 6.

Stage 6: Combining, reformatting, and sorting

Use Job Control Language (JCL) of the form in Table 9 to combine different batches of data, reformat to a uniform record type of length 120, sort records, and write the final data file to tape. Check the printout to be sure all steps have been executed correctly. The PL/1 programs called by the JCL also put out advisory messages about the number of records read, records changed to data type, and so on. Check the printout for error messages. If the job is executed without error, the combined final data file is now on tape. The data file is named with a five- or six-character name of the form IIIYYT, where III is the island name abbreviation, YY the year, and T the optional data type if the files for a year have been broken by data type.

MONK SEAL DATA STATUS FORM

Source ID codes: RM009 (data), RM015 (ID list) Island: Year: Batch No.:

Stage	Task	Initial and date				Filename
1	Data received from MMES Data entered (RM009C01) Data verified File to AA tape					
2	Run assn. checking (RM009X01) Data listing (RM009X02) Corrections made by MMES Editing completed by DMTS File to back-up tape					
3	Run verification (RM009X03) Corrections made by MMES Editing completed by DMTS File to back-up tape					
4	Run ID/sighting (RM009X04,X05) ID list completed ID list entered (RM015) Format ID list (RM015X01) Run ID list checking (RM015X02) Run haul chart (RM009X09) Editing completed by DMTS					Batch no. of ID list
5	Run standardization (RM009X06) Corrections made by MMES Editing completed by DMTS					
6	Combine batches, format, sort Check JCL output for errors Final data file to AC tape Final data listing from UHCC Pre-stand. file to AB tape Pre-stand. file listing ID list to tape (RM015AB1)					

Form HL-0146 (1/88)

Appendix E

Seal Census Form

PAGE _____ OF ____

ISLAND _____ OBSERVER ☐☐☐ TIME BEGIN ☐☐☐☐ END ☐☐

DATE _____ DATA TYPE ____ TEMP. ☐☐ WIND ☐☐

NUMBER ____ CLOUD ☐☐ PREC. ☐

LINE NO.	SECTOR	SIZE	SEX	ID NO.	ID ?	BLEACH	BLEACH ?	TAG NO.	TAG L/R	TAG COL.	TAG ?	BEACH POS	MOLT %	MOLT ?	DISTURB	TIME	A LINE NO	A DIST	A BEHAVIOR	B LINE NO.	B DIST.	B BEHAVIO
1																						
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						
11																						
12																						
13																						
14																						
15																						
16																						
17																						

NOTES: _____

ix E.--Continued.

SIZE	SEX	ID NO.	ID ?	BLEACH	BLEACH ?	TAG NO.	TAG L/R	TAG COL	TAG ?	BEACH POS	MOLT %	MOLT ?	DISTURB	TIME	A LINE NO.	A DIST.	A BEHAVIOR	B LINE NO.	B DIST.	B BEHAVIOR	CONTINUE	NOTES

Appendix F.--Directions for completing the Seal Census Form.

The Seal Census Form (Form HL-0118, Appendix E) is used to record all all census and related data. This appendix briefly explains all entries on the census form. For more complete explanations of some items and the definitions of such terms as census, sector, size, ID number, bleach number, and tag number, see the monk seal procedures manual (see text footnote 1). The directions for completing the census form have changed slightly from year to year, mostly to allow for new behavior codes. This is the 1988 version.

ISLAND--Name of island and atoll, e.g., East, FFS

OBSERVER--Three initials

TIME BEGIN and **END**--On a 24-h clock, e.g., 6 p.m. = 1800, for the group of pages

DATA TYPE--C = Census = a complete count on an island begun around 1300
A = Atoll-wide census (usually completed during 1 d)
P = Patrol = any other observation not on a timed census
I = Incidental observations
Other letters may be used at your discretion to indicate specific kinds of noncensus data, e.g., M for male observations.

NUMBER--Censuses and patrols may be assigned numbers at your discretion. Atoll counts extending over 2 d must be numbered.

PAGE--If census (or patrol) requires three pages, then mark first page as "page 1 of 3" and so on. If two people census with separate sheets, then combine page numbers; person A has pages 1 and 2, while person B has pages 3 and 4 of a four-page census day.

TEMP.--Temperature in degrees Celsius at beginning of census or patrol

WIND--Speed: 0 = no wind, calm (<5 knots)
1 = light breeze (5-15 knots)
2 = strong wind (>15 knots)
Thus, [2][N][N] = strong wind from north

Direction: NW, NN, NE, EE, SW, SS, SE, WW

CLOUD--Cloud cover: 00 = no clouds
01-09 = 10 to 90% cover
10 = 100% cover

PREC.--Precipitation: 0 = no precipitation
1 = mist/drizzle
2 = rain
3 = intermittent rain

Appendix F.--Continued.

SECTOR--Location on island (e.g., 1-49 on Lisianski; 99 = no island)

SIZE--P1 = Nursing pup, wrinkles
P2 = Nursing pup, no wrinkles
P3 = Nursing pup, blimp, black
P4 = Nursing pup, molting
P5 = Nursing pup, molted
(P1–P5 = P = Nursing pup)
PW = Prematurely weaned (undersized) pup
W = Weaned pup
J1 = Juvenile I
J2 = Juvenile II
(J1, J2 = J = Juvenile)
S3 = Subadult III
S4 = Subadult IV
(S3, S4 = S = Subadult)
(J, S = I = Immature)
A = Adult
T1 = Turtle, juvenile (<65 cm)
T2 = Turtle, subadult (65-80 cm)
T3 = Turtle, adult (>80 cm)
(T1–T3 = T = Turtle)
U = Seal of unknown size

SEX--M = Male
F = Female
U = Unknown

ID--Record ID number of seal if known; right justified: seal #25 = _25

? column: ✓ or 1 = ID number is questionable
0 = seal is definitely not an IDed animal

BLEACH--Bleach number of seal if known; right justified; these columns may also be used for any temporary numbers assigned in the field

? column: ✓ or 1 = bleach is present, but the number is questionable
0 = seal is definitely unmarked
4 = partially read bleach number completed from other data

TAG--Tag number if known; right justified: tag #K23 = __K23

L/R: Tag position L = tag on left flipper
R = tag on right flipper
B = tags on both flippers
(only one tag number need be entered)

COL: Color code T = tan (Laysan) G = green (Lisianski)
K = gray (Kure) R = red (Midway, Necker, Nihoa)
Y = yellow (FFS) B = blue (Pearl and Hermes)
M = metal P = plastic Riese

Appendix F.--Continued.

? column: ✓ or 1 = seal is tagged, but the number is questionable
0 = seal is definitely not tagged
4 = partially read tag completed from other data
5 = incompletely read tag, but partial data are certain

BEACH POS.--Location of seal or turtle when observer comes abreast of animal (e.g., if seal is seen midbeach from a distance and yet is at the waterline when the observer come abreast, the seal is recorded as being at the waterline).

0 = animal floating in water or on an offshore rock (not included in census tally but may be used for behavioral data)
1 = along waterline, on wet sand
2 = midbeach, on dry sand
3 = vegetation zone or beach crest, on permanent beach

MOLT--Percentage of old pelage lost, optional for nursing pups

blank or 0 = no molting evident
__1-_99 = 1 to 99% molted (right justified)
100 = 100% molted, freshly molted, up to 1 mo after molt
? column: ✓ or 1 = % molt estimate is questionable
0 = seal is definitely not molting

DISTURB--The degree to which the seal may have been disturbed by observer

blank or 0 = no disturbance, or seal merely looked at observer
1 = seal vocalized, gestured, or moved ≤2 body lengths
2 = seal alerted to observer and moved >2 body lengths
3 = seal alerted to observer and fled into water

TIME--The time of an observation, on a 24-h clock, e.g., 6 p.m. = 1800

ASSOCIATION DATA--There is room to describe two different associations (A and B).

Active associations
1) noted for all except behaviors between mother and nursing pup
2) must take place within 30 m of observer
3) subjects may be any distance apart

Appendix F.--Continued.

Spatial associations
1) noted as observer comes abreast of the subject
2) entangling object: distances <2 m away
3) individual seals and turtles
- mother-pup pair (N): any distance
- all others (L): distances ≤10 m away, record two nearest neighbors in straight line of sight
- record seal-seal and turtle-seal but not turtle-turtle associations

LINE NO.--Identity of the other party in the association

1) if a seal or turtle, put its line number here
(note line number refers to within same census page only)

2) if an entangling object, put
NR or 99 = net and/or rope
FL or 98 = flotsam other than above

DIST.--Closest distance during behavior

0 = body contact
1 = <2 m
2 = 2-5 m
3 = >5 m (>5 m but ≤10 m in the case of L behavior code)

BEHAVIOR--Up to four behaviors may be recorded for each association, but N, E, X, and O should not appear together with other behaviors

1) individual seal or turtle
a) active behavior

A = approach/investigate/sniff/nudge	
B1 = bite, nip	B = bite
B2 = bite, draws blood/breaks skin	
C1 = chase, ≤2 body lengths*	C = chase*
C2 = chase, >2 body lengths*	
D = displace*	
F1 = flee/move away, ≤2 body lengths	F = flee/move away
F2 = flee/move away, >2 body lengths	
J1 = joust ≤30 s*	J = joust/spar/fight*
J2 = joust >30 s*	
M1 = mount/attempted mount ≤30 s	M = mount/attempted
M2 = mount/attempted mount >30 s	
P = play*	
R = roll/present ventral	
V = vocalize	
Z = cruising	

Appendix F.--Continued.

b) spatial association
N = mother-pup pair (any distance)
L = association by location only (distance ≤10 m apart, for all except mother-pup pairs)

c) contests (optional)
L1 = pair association*
Q = loser*
W = winner*
Y = tie*

* requires a corresponding code on the line of the associated seal

2) entangling object
L = association by location only (distance <2 m)
E = subject is entangled

3) nothing nearby
0 = no behavior or association

4) no data
X = no association data on census

CONTINUE--If the same animal is recorded on another line for any reason (e.g., additional tag or association, behavior at a later time, change of beach position), put the line number you are continuing from here. Lines may be continued only within the same page.

NOTES--✓ or 1 if you have handwritten notes on the observation. Put handwritten notes on the back of the census form, labeled by line number. The following note codes have special meanings:

L = observation is purely incidental--i.e., not on census or patrol
R = seal is on rock offshore (combined with beach position 0)
D = seal is dead

Additional notes:

1. Weather information (except temperature) should be a summary of the entire day up until the end of the census, not merely an instantaneous observation.

2. A separate data sheet should be filled out for each date, observer, data type, and island within an atoll. If no seals are present, you should still fill out the information at the top of the census form and write "No seals" in the data area. If the island itself is not present, indicate this by using "99" for the sector code, leaving the rest of the (first) line blank.

Appendix F.--Continued.

3. All associations (except with entangling objects) should be in pairs, i.e., between animals on two different lines. If the behavior is active, you should fill in the line numbers, distances, and behavior codes for both animals involved in the association. If the behavior is N or L, however, you may record the association on only one of the lines, and the computer will fill in the other line.

4. An association should either be all blank or have the 0 or X behavior only, with no line number or distance, or have a line number, a distance, and some behavior code (other than 0 or X) all present.

5. On a census it is assumed that molt, disturbance, and behavioral data will be taken. Thus, on a census data sheet, no code in any of the A or B columns means that the seal was alone, whereas on a patrol data sheet, no code may simply mean that no data were taken. It is not necessary to put an 0 code for each unassociated animal on census. The computer will fill this in later. If you are unable to record association data on a census for any reason, indicate this information with an X for the behavior code.

6. Record all tag sightings explicitly (i.e., both left and right tag numbers) at least once during your stay. When a pup is tagged, record the first occurrence of that tag on a census data sheet for that date as well as on a tagging card. If a seal is identified via a tag, it is not necessary to determine and enter its ID number as well as tag number on the census form. The ID number will be added by computer later.

Appendix G.--Directions for completing the ID list.

The ID list (Form HL-0147, Appendix H) gives all seals identified in any way (i.e., by scars, bleach marks, or tags) seen on an island or atoll during a particular year. It should not include seals that were tagged, bleached, or identified in previous years but not seen in the current year. The list records the correspondences among the different types of identification and assigns a size for each seal for that year. Besides this basic information, the ID list contains ancillary information on molting and weaning dates to allow certain checks to be performed by the ID list checking program and the standardization program. At the top of the form, fill in the name of the island (or atoll) and the year to which the ID list applies. Then fill in each line as completely as possible for each seal.

ID No.

The ID number is a four-character code, beginning with a letter prefix that identifies the island on which the ID number was first assigned to the seal. The letter prefix is the same as the tag color assigned to each island (Y, T, G, B, K, or R).

Bleach No.

Bleach numbers or temporary field numbers should be right justified, without leading zeros.

Tag No.

Tag numbers should be right justified without leading zeros. Each tag should also have a position (L or R) and color (Y, T, G, B, K, R or M). There is room to record three tags on each line.

Size

One of the standard size codes from the census form should be entered here. During standardization, all sightings of a particular seal will be given this size. To help decide which size to assign a seal, consult the ID-sighting list for a summary of the sizes on various dates. Size for pups of the year may be either P or W.

Sex

As on the census form, sex is either M, F, or U. U should be rare, however, because these are identified seals.

Appendix G.--Continued.

Molt Begin Date, Molt End Date

Dates entered in these columns enable the standardization program to perform additional checks on the data. The dates entered in these columns are strictly for checking purposes; they indicate that something was known of molt condition, but the dates are not necessarily known beginning and ending molt dates, or even the best estimates of beginning and ending molt dates. Nevertheless, they do allow certain consistency checks to be performed.

If the actual begin and end dates of the molt are known, enter them here numerically as month and day (MMDD); year is given at the top of the form. If you did not keep track of each seal's molt during the field season, these dates will not be readily available to you. In that case, let the haul chart program pull out the dates for you, and add them to the ID list after you receive the output of the haul chart program. If either or both begin and end molt dates are on the ID list during standardization, the computer checks that molt is $\leq$10% before the molt begin date, is >10% but <100% from the molt begin date to the day before the molt end date, and equals 100% on the molt end date and for at least 1 mo thereafter.

Even if molt dates are not known, you may use this column to make the computer check the data. If during the field season the seal had not yet molted, enter the day after the last date of your field season in the molt begin column, and leave the molt end date blank. This will make the computer check that all sightings of this seal during the field season do in fact have molt recorded as $\leq$10%. On the other hand, if a seal already completed its molt when the field season began, enter the first date of your field season as the molt end date and leave the molt begin date blank. This will make the computer check that all sightings of this seal do in fact have molt recorded as 100% (for 30 d) or blank.

Pup Birth Date, Wean Date

As with molt dates, birth and wean dates entered on the ID list enable the standardization program to perform additional checking. They are entered for checking purposes only and do not imply that birth and wean dates are necessarily known. Of course, if the actual birth and wean dates are known, enter them here (in the format MMDD). The standardization program will then be able to check that the pup is never recorded as being seen before its birth date, that its size is P between the birth and wean dates, and that its size is W on the wean date and on any following dates. If dates are not known exactly or only one of the dates is known, you may still use this information to make the computer check the data. For example, if a pup was already weaned when you arrived, enter your arrival date as the wean date and leave the birth date blank. This will make the computer check that every sighting of this pup during the field season is in fact recorded as size W.

Appendix G.--Continued.

Nursing ID

The nursing ID column is used to fill in identifications of nursing pups by association with known adult females. If you are confident that a pup was always associated with the same adult female (i.e., no switching occurred), enter the female's ID (or bleach) number here, on the pup's line. The computer will then assume that the nursing pup associated with this adult female is the same pup and, during standardization, fill in the pup's ID and tag numbers accordingly each time a pup occurs with her. On the other hand, if you are not sure that no switching occurred, leave the nursing ID column blank. In this case, the computer will not fill in the identity of the pup during the nursing period. Because nursing ID is used in this way, a nursing ID entry does not necessarily imply that the pup's mother was known, nor does the lack of an entry imply that the mother was not known.

New ID?

Enter a "√" or "1" in this column if the ID or tag number (but not bleach number because it is not unique) is new for the year shown at the top of the form. The ID list checking program uses this information to check this ID list against previous ID lists for the same island. ID's marked as new should never appear on any previous ID list; ID's not marked as new should always appear on at least one previous ID list.

The ID list checking program will flag, as a possible error, any difference in the tags of two seals with the same ID number. Therefore, an error message will appear whenever a seal has been retagged or has had a new tag added. When this is known to be the case, the printing of the error message may be suppressed by entering a "2" in this column. The "2" should be used with discretion because its use may mask the incorrect entry of a tag number.

Notes

Notes may be made in this column, although they will not be entered on the computer.

MONK SEAL IDENTIFICATION LIST

Page ___ of ___

Island: Year:

ID list batch no.: Source ID Code: RM015 Data batch nos.:

ID No.	Bleach No.	Tag No.	L/R	COL.	Tag No.	L/R	COL.	Tag No.	L/R	COL.	Size	Sex	Molt Begin Date	Molt End Date	Pup Birth Date	Pup Wean Date	Pup Nursing ID	New ID?	Notes

Appendix I.--Job Control Language (JCL) examples for routine monk seal data management tasks. The JCL card images are stored collectively on the Mohawk as different lines within the data set RM009JCL and on the IBM system as T010760.PRINT.CNTL. A lower case "o" indicates an item which must be filled in before the JCL is submitted.

CONTENTS

		Page
1.	Transferring Data from IBM Tape to Mohawk Disk	87
2.	Transferring Data from Mohawk Disk to IBM Tape	89
3.	"Docutaping" the Files on an IBM Tape	91
4.	Printing out Data from an IBM Tape	92
5.	Initializing a New Tape	94
6.	Copying Files from One Tape to Another	95
7.	Reverse Formatting Monk Seal Data (RM009AC1)	97
8.	Compiling PL/1 Source Code into a Load Module	99

Appendix I.--Continued.

---

1. Transferring Data from IBM Tape to Mohawk Disk (lines 0-11)

Two data sets on the Mohawk fixed disk are normally used--one for JCL transmitted to the IBM system and another to receive the desired data. KYSOURCE is used to edit the JCL in a temporary work area after copying in lines 0-11 of RM009JCL, then HASP is used to transmit the job stream to the IBM via card reader emulation. After the data have been received, KYSOURCE is used to view the data set and remove unwanted header and trailer records that are artifacts of the punch process.

//oooooooo JOB (107o,3KC),FRED

The job card is interpreted by the Job Entry Subsystem (JES) as the beginning of a computer run. Job name (the eight o's), account number (107o), and programmer's name (FRED) must be completed before submission. The only optional parameter used here is "3KC"; this parameter allows up to 3,000 card images to be punched, instead of the default value of 2,000. Punching cards is what the Mohawk system does in terms of the IBM system when it receives 80-column card images comprising the desired data file. Physical cards are not used, but rather, the Mohawk emulates a card punch to the IBM.

// EXEC SETUP

The tape setup procedure is invoked, prompting computer operators in the machine room at University of Hawaii Computing Center (UHCC) to mount a tape volume on a tape drive unit. While this is being done, or if a tape unit is not available, job execution may be temporarily suspended. If tapes are not used, this job step (this line and the one below it) should be deleted, and the job may be run in the express class.

V=oooooo,SZ=o,NORING

This is input to the tape setup program, containing tape volume serial number (i.e., X22988 or CC1891) and reel size (i.e., F (full 2,400 ft), H (half 1,200 ft), or M (mini 600 ft)). "NORING" means that the tape is not equipped with a write-enable hub ring and should not be written to by this job. If more tapes are used, extra lines should be inserted in the same format.

// EXEC PGM=IEBPTPCH

This JCL statement invokes the IBM print/punch utility program, which performs the actual data transfer.

Appendix I.--Continued.

```
//SYSPRINT   DD   SYSOUT=A
```

This statement defines the system output device (line printer) to be used by the print/punch utility program for a short message indicating normal completion of the transfer or any error that might occur during transfer. This same device receives all printed output resulting from the job.

```
//SYSUT1   DD   UNIT=XTRK,DISP=SHR,VOL=SER=oooooo,
//    LABEL=(oo,SL),DSN=oooooooo
```

The source file for the data transfer is defined to the print/punch utility program by a statement that spans two lines. Volume serial number must match that specified in the tape setup step. The first subparameter of the LABEL parameter must contain the logical file number of the desired data on the tape volume (i.e., 89 = the 89th file). Data set name (DSN) must match the data set name of the file on tape (i.e., D87123B or RM009AA1.AD87123A) before the tape label is verified and the file opened.

```
//SYSUT2   DD   SYSOUT=P
```

The destination device for the data transfer is defined by this statement as a card punch to the print/punch utility program. Because the job is submitted by remote station to the IBM, printed and punched output is directed back to the same remote station. If this same job was submitted directly to the IBM (i.e., via a time-sharing terminal), the printed and punched output would be directed to default devices in the UHCC input/output room (where physical punched cards would be produced) unless special routing parameters are included with the job card.

```
//SYSIN   DD   *
               PUNCH MAXFLDS=1
               RECORD FIELD=(80,1,,1)
```

These card images define a control data set for the print/punch utility program as two lines of data residing within the JCL stream. The first control card indicates that a punch operation is desired, utilizing one field of data per record. The second statement indicates an input field length of 80, beginning in column 1, no data conversion, and an output field location of 1 for the output records.

```
//
```

This card image is interpreted by the job entry subsystem (JES) as the end of the job stream.

Appendix I.--Continued.

---

2. Transferring Data from Mohawk Disk to IBM Tape (lines 12-21)

Several methods may be employed to compose a job stream in which the data, in the form of card images, are sandwiched between lines in the form of lines 12 through 21 of RM009JCL, and the null statement which terminates the job.

KYSOURCE may be used to insert the 10 lines of JCL in front of the data set and to add the double slashes to the bottom of the data set and then remove them after the composite file is submitted to IBM via HASP.

A work area may be used, with copy operations bringing in first the 10 lines of JCL, the data set, and then entering the double slashes and submitting the work area to the IBM via HASP. The work area is then deleted by DISKU (Disk Utility).

Data sets may be renamed with DISKU so the first contains the 10 lines of JCL, the second the data, and the third the double slash card. The data set names make a numeric sequence that is automatically concatenated by HASP during submission.

//oooooooo JOB 107o,FRED

This job card signals the start of a computer run to the JES of the IBM. Note that no optional parameters are used, as this type of job normally does not require them.

// EXEC SETUP

The tape setup program is invoked, prompting computer operators in the machine room at UHCC to mount a tape volume on a tape drive unit. While this is being done, or if a tape unit is not available, job execution may be temporarily suspended. If the data are not to be transferred onto tape, (i.e., direct access storage device), this line and the one below it should be deleted, and the SYSUT2 data definition statement in the following job step modified to define the proper output device. Depending on job requirements, an express job class may also be used.

V=oooooo,SZ=o,RING

This is input to the tape setup program, containing tape volume serial number (i.e., X22988 or CC1891) and reel size (i.e., F = full (2,400 ft), H = half (1,200 ft), and M = mini (600 ft)). "RING" means that the tape is to be equipped with a write-enable hub ring and written to by this job.

Appendix I.--Continued.

```
//     EXEC   PGM=IEBGENER
```

This statement invokes the IBM-supplied data set utility program that performs the actual data transfer. Required data definition (DD) statements are SYSPRINT, SYSIN, SYSUT2, and SYSUT1.

```
//SYSPRINT   DD   SYSOUT=A
```

This statement defines the system output device (1ine printer) to be used by the utility program for a short message indicating normal completion of the transfer or any error that might occur during transfer. This same device receives all printed output resulting from the job.

```
//SYSIN   DD   DUMMY
```

No control information is passed to the utility program (IEBGENER) because no optional editing features are desired and the data are not a partitioned data set. This statement is nonetheless required for proper job execution.

```
//SYSUT2   DD   UNIT=XTRK,VOL=SER=oooooo,
//     LABEL=(oo,SL),DSN=oooooooo
//     DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000,DEN=3)
```

The destination file for the data transfer is defined to the utility program by a statement spanning three lines. Volume serial number must match that specified in the tape setup step. The first subparameter of the LABEL parameter must contain the logical file number of the new file being created on the tape volume (i.e., 89 = 89th file). Data set name (DSN) must match the data set name of the file on tape (i.e., D87123B or RM009AA1.AD87123A) before the tape label is verified and the file opened.

```
//SYSUT1   DD   *
```

The source file for the data transfer is defined as residing in the job stream and includes all succeeding card images until the next JCL statement (identified by two slashes in columns 1 and 2) is encountered. The data may be in a file named in numeric sequence concatenated during transmission by HASP or may appear directly in either a work area or in the actual data set file. If the source data reside on any other device within the IBM system, this statement must be appropriately modified.

```
//
```

This statement is not stored in RM009JCL but should be added to the bottom of the job stream, either at the bottom of the work area submitted via HASP to the IBM or to the bottom of the data set, or in a separate file that is concatenated by HASP. Its appearance signals the end of the input data and the end of the job submission.

Appendix I.--Continued.

---

3. "Docutaping" the Files on an IBM Tape (lines 22-26)

The docutape procedure is a documentation tool that produces a list of the files on a given tape volume, including logical file numbers, data set names, record lengths, block sizes, number of blocks per file, dates files that were created, and approximate length of tape used. After data have been added to a tape, or whenever doubt exists as to the contents of a tape, a docutape listing should be produced. These listings are routinely posted to facilitate response by DMTS to requests by MMES.

KYSOURCE is used to copy lines 22 through 26 of RM009JCL to a work area, which is submitted to the IBM via HASP after adding job and tape volume information.

//oooooooo JOB 107o,FRED,CLASS=K

This job card follows a standard format. The source ID code or tape volume serial number is usually used for the job name. Note that the account number must be completed and the programmer's name supplied. A special job class is used for a docutape run (class K), associated with an initiator running at a lower priority than most jobs in the job mix. If the system is nearly saturated, a job may wait in a queue for a significant amount of time.

// EXEC SETUP

The tape setup program is invoked, prompting operators at UHCC to mount a tape volume on a drive unit. While this is being done, or if a tape unit is not available, job execution may be temporarily suspended.

V=oooooo,SZ=o,NORING

This statement is input to the tape setup program, containing tape volume serial number (i.e., X22988 or CC1891) and reel size (i.e., F = full (2,400 ft), H = half (1,200 ft), and M = mini (600 ft)). "NORING" means that the tape is not to be equipped with a write-enable hub ring and cannot be written to. Usually either a pair of tapes or several tapes are docutaped in one job, and an input card image to the tape setup program is required for each tape.

Appendix I.--Continued.

// EXEC DOCUTAPE,VOL=oooooo,UNIT=XTRK

This statement executes the docutape procedure for the tape volume serial number given in place of the six o's. The second parameter indicates a nine-track tape format. Recording density is sensed automatically and shown on the docutape listing. If more tapes are being docutaped in the job, this statement must be repeated for each tape volume.

//

This null statement designates the end of the job submission to the JES.

4. Printing out Data from an IBM Tape (lines 27-43)

Printouts of data are not routinely required but are done when final RM009AC1 files are produced. If the data set is small (<3,000 records), a job may be submitted through the Mohawk's HASP system and the printout received on the Mohawk line printer. If the data set is larger, it may be more convenient to submit the job via a time-sharing terminal connected to the IBM system, and receive the output from the high speed line printers in the input/output room of the UHCC.

//ooooooooo JOB 107o,FRED

This job card reflects a minimal configuration, with no optional parameters. If a large data set is to be printed, optional parameters, especially for number of expected lines, should be coded.

// EXEC SETUP

The tape setup program is invoked, prompting operators at UHCC to mount a tape volume on a drive unit. While this is being done, or if a tape unit is not available, job execution may be temporarily suspended.

V=oooooo,SZ=o,NORING

This statement is input to the tape setup program, containing tape volume serial number (i.e., X22988 or CC1891) and reel size (i.e., F = full (2,400 ft), H = half (1,200 ft), and M = mini (600 ft)). "NORING" means that the tape is not to be equipped with a write-enable hub ring and cannot be written to.

// EXEC PGM=IEBPTPCH

This statement invokes the IBM print/punch utility program, which performs the actual printing operation.

Appendix I.--Continued.

```
//SYSUT1   DD  UNIT=XTRK,DISP=SHR,
//       VOL=SER=oooooo,LABEL=(oo,SL),DSN='RMOooAo1.AooooooA'
```

This statement defines the data set to be printed out. Note that the tape volume serial number and logical file number must be specified, as well as the data set name before submission. The format of the data set name follows the convention established by DMTS for permanent tapes.

```
//SYSUT2   DD   SYSOUT=A,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=13300)
```

This statement defines the output device on which the printout will be produced as the system line printer. The data control block is specified so even records as long as the 120-character format of the RM009AC1 data can appear centered on the printout.

```
//SYSIN   DD  *
```

This statement marks the beginning of the control statements for the print/punch utility program. For convenience, they usually reside in the JCL stream, although they are not JCL.

```
   PRINT   TYPORG=PS,MAXFLDS=1
```

The print/punch utility program interprets this input as directing a print operation of a physical-sequential file so that only one field from each record will be selected.

```
   RECORD   FIELD=(80,1,,26)
```

Further specification of the way each record is to be printed is communicated: The source field is 80 characters; beginning at the first column of each data record, no data conversion is to take place and, when printed, is to be positioned beginning at column 26 so as to appear centered.

```
   TITLE ITEM=('oooooo        oo        RMOooAo1.AooooooA',46)
```

When the print/punch utility program formats the pages of output, a title up to 40 characters may be presented at the top of each page. Although the exact content of the title is optional, the above format suggests the six-digit tape volume serial number separated by some blanks from the file number, followed by some more blanks and the data set name. Indenting the title 46 spaces lets it appear roughly centered.

```
   TITLE ITEM=(' ')
```

A maximum of two title lines is permitted. In this example, the second line is utilized as a blank line to separate the title from the data on each page.

Appendix I.--Continued.

//SYSPRINT DD SYSOUT=A

This statement defines the system output device (line printer) to be used by the print/punch utility program for the short message conveying any error messages produced or indicating successful completion of the printout.

//

This null statement marks the end of the job submission to the JES.

5. Initializing a New Tape (lines 44-49)

Before a new tape can be put into service, it must be registered at the UHCC with a unique six-digit volume serial number. Because a new tape contains no magnetically encoded information, standard IBM tape labels must also be written onto the tape to facilitate subsequent processing. This involves submitting the tape over the counter to the UHCC operators and running a job consisting of the following statements.

//oooooo JOB oooo,FRED

A job card is required, but only the job name, account number, and programmer's name must be specified.

// EXEC SETUP

The tape setup program is invoked, prompting operators at UHCC to mount a tape volume on a drive unit. While this is being done, or if a tape unit is not available, job execution may be temporarily suspended.

V=oooooo,SZ=o,RING

This statement is input to the tape setup program, containing tape volume serial number (i.e., X22988 or CC1891) and reel size (i.e., F = full (2,400 ft), H = half (1,200 ft), and M = mini (600 ft)). "RING" means that the tape is equipped with a write-enable hub ring and can be written to.

// EXEC LABELD,DEN=3,TYPE=XTRK

The procedure that performs the labeling is invoked, along with parameters indicating a recording density of 1,600 bytes per inch in a nine track format. These values are standards established by DMTS and are used for all permanent tapes at the Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, except as required for certain special purposes.

Appendix I.--Continued.

LABEL INITT SER=oooooo

This control statement is interpreted by the labeling procedure as input and defines the volume serial number to be recorded on the volume header label. This number is the same number appearing on the external adhesive labels and the registration form received from the computing center.

//

The null statement, containing only two slashes in the first two positions, marks the end of the job submission.

6. Copying Files from One Tape to Another (lines 50-66)

Permanent tapes are maintained in pairs consisting of a primary tape volume, or master, and a secondary tape volume, or backup. Newly created files are added to the master tape and then copied to the backup tape. Several files are commonly added in a very short time frame, and while files should be added one at a time to the master tape to ensure the proper completion of each operation, it is often convenient to copy a number of files to a backup tape by submission of a single job. This example illustrates use of an instream procedure to minimize both coding effort and the possibility of error.

//oooooooo JOB 107o,FRED

This job card signals the start of a computer run to the JES of the IBM. Note that no optional parameters are used, as this type of job normally does not require them; however, if unusually large amounts of data are to be copied, job parameters may have to be modified to increase data resources allocated for the job run.

// EXEC SETUP

The tape setup program is invoked, prompting computer operators in the machine room at UHCC to mount a tape volume on a tape drive unit.

V=oooooo,SZ=o,RING

This is input to the tape setup program, containing tape volume serial number (i.e., X22611) and reel size (i.e., F = full (2,400 ft), H = half (1,200 ft), and M = mini (600 ft)). "RING" means that the tape is to be equipped with a write-enable hub ring and written to by this job.

V=oooooo,SZ=o,NORING

Input to the tape setup program is continued, now directing the mounting of the master tape from which data will be read.

Appendix I.--Continued.

```
//COPY   PROC
```

This statement marks the beginning of the instream procedure for repetitively copying files from one tape to another. Use of a procedure simplifies the JCL by grouping the JCL statements that do not change between job steps.

```
//     EXEC   PGM=IEBGENER
```

This statement invokes the IBM-supplied data set utility program that performs the actual data transfer. Required data definition (DD) statements are SYSPRINT, SYSIN, SYSUT2, and SYSUT1.

```
//SYSUT1   DD   UNIT=XTRK,DISP=(OLD,PASS),
//     VOL=SER=oooooo,LABEL=(&FILE,SL),DSN=&DSN
```

The input data set is defined as residing on tape. The volume serial number of the tape must be completed before submission, but the symbolic variables &FILE and &DSN are defined when the procedure is executed.

```
//SYSUT2   DD  UNIT=XTRK,DISP=(NEW,PASS),
//     VOL=SER=oooooo,LABEL=(&FILE,SL),DSN=&DSN,
//     DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000,DEN=3)
```

The output data set is defined as a new data set to be placed on the backup tape volume. Although similar to the data definition statement used for the input file, the data control block is specified so no doubt exists as to the proper attributes associated with the backup file. A blocking factor of 100 is always specified, but if RM009AC1 data are being copied, record length should be 120 and block size 12,000. Any incompatibility between source and destination files will be detected by the utility program.

```
//SYSPRINT   DD   SYSOUT=A
```

This statement defines the system output device (line printer) to be used by the utility program for a short message indicating normal completion of the transfer or any errors that might occur during transfer.

```
//SYSIN   DD   DUMMY
```

No control information is passed to the utility program (IEBGENER), because no optional editing features are desired and the data are not a partitioned data set. This statement is nonetheless required for proper job execution.

Appendix I.--Continued.

```
//     PEND
```

This statement marks the end of the instream procedure, limiting the scope of the statements to be repeated when the procedure is executed.

```
//     EXEC   COPY,FILE=oo,DSN='RMOooAo1.AooooooA'
//     EXEC   COPY,FILE=oo,DSN='RMOooAo1.AooooooA'
```

These statements show how the procedure is executed for successive files. Each statement performs a copy operation and is a job step. Logical file numbers must be specified in ascending order, increasing by one in each job step to prevent overwriting of data. Data set names in this example conform to DMTS convention for naming files on permanent tapes. If job resources are exhausted before completion of all job steps, it is necessary to resubmit only those job steps that were not satisfactorily completed.

```
//
```

At the physical end of the job, the null statement consisting of only two slashes signals the end of the submission to the JES.

7. Reverse Formatting Monk Seal Data (RM009AC1) (lines 67-79)

After monk seal census data (RM009AB1) in the 80-column, two-card format have been corrected, combined, sorted, and formatted into a single format of 120 characters, it is sometimes desirable to reconstitute the finished data into their original form. This is accomplished by a reverse formatting program designed for this purpose, executed by submission of JCL similar to this example.

```
//oooooooo   JOB   107o,FRED
```

This job card signals the start of a computer run to the JES of the IBM. Note that no optional parameters are used, as this type of job normally does not require them.

```
//JOBLIB   DD   DSN=T010760.RM009LIB,DISP=SHR
```

This statement conditions the system to access the load module library established in support of monk seal census data on the IBM disk storage units. Besides the reverse formatting routine, the library contains programs used in formatting monk seal data.

Appendix I.--Continued.

```
//    EXEC   SETUP
```

The tape setup program is invoked, prompting computer operators in the machine room at UHCC to mount a tape volume on a tape drive unit. While this is being done, or if a tape unit is not available, job execution may be temporarily suspended. If tapes are not used, this line and any input lines below it should be omitted. Depending on job requirements, an express job class may also be used.

```
V=oooooo,SZ=o,RING
```

This is input to the tape setup program, containing tape volume serial number (i.e., X22988 or CC1891) and reel size (i.e., F = full (2,400 ft), H = half (1,200 ft), and M = mini (600 ft)). "RING" means that the tape is to be equipped with a write-enable hub ring and written to by this job (i.e., the output tape).

```
V=oooooo,SZ=o,NORING
```

This input statement contains the information for the input tape volume to be used during the job run. If the input data are not on tape, this statement should be omitted.

```
//    EXEC   PGM=RM009T04
```

This statement invokes the reverse formatting program. Required data definition (DD) statements are SYSIN, SYSOUT, and SYSPRINT.

```
//SYSPRINT   DD   SYSOUT=A
```

This statement defines the system output device (line printer) to be used by the reverse formatting program for a short message indicating normal completion of the job step. This same device receives all printed output resulting from the job.

```
//SYSIN    DD   UNIT=XTRK,DISP=SHR,VOL=SER=oooooo,
//     LABEL=(oo,SL),DSN='RM009AC1.AooooooA
```

The source file for the reverse formatting process is defined by this statement, which spans two lines. In this example, the source data resides on a tape volume. Depending on specific job requirements, the data may reside on any device within the scope of the IBM system. The data may not reside on the Mohawk because the data path between the Mohawk and the IBM system is only 80 columns wide. The source data must conform to the 120-column format established for RM009AC1, the combined and formatted monk seal census data.

Appendix I.--Continued.

```
//SYSOUT   DD   UNIT=XTRK,VOL=SER=oooooo
//     LABEL=(oo,SL),DSN=oooooooo,
//     DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000,DEN=3)
```

The destination for the reverse formatted data transfer is defined to the system in this example as a tape file. Depending on specific requirements, this file may be directed to any device within the scope of the IBM system, including being punched directly onto the Mohawk.

```
//
```

The null statement marks the end of the job submission to the job entry subsystem.

8. Compiling PL/1 Source Code Into a Load Module (lines 80-85)

Specialized tasks, such as formatting and reverse formatting monk seal census data, require the development of programs that can perform these tasks on the IBM system. PL/1 is the language of choice: It is compatible with structured programming techniques, its wide array of features facilitate any desired manipulation, it produces machine code that is extremely compact and efficient when run on the IBM, and it is in widespread use in the programming community. Discussion of specific language elements is beyond the scope of this example, which shows the JCL needed to create a relocatable load module in a load library on the IBM disk volumes.

```
//oooooooo   JOB   oooo,FRED,CLASS=A
```

The job card initiates the execution of the job that will create the load module. Note that the express class is used because no tape mounts are requested and the job is less than three job steps.

```
//    EXEC   PLIXCL
```

This statement executes the procedure that compiles and link-edits the PL/1 program. Compilation is a translation process performed on the source deck, whereas link-editing is the resolution of references to service routines and addresses used by the program so the completed load module is completely self-sufficient and may be relocated anywhere in memory for execution.

```
//COMPILE.SYSIN   DD   *
```

The source code data set is defined to the system as card images residing in the job stream, beginning with the next card image and continuing until the next JCL statement is encountered. Modification of this data definition statement is required if the source code is separated and stored on another device.

Appendix I.--Continued.

```
//LOAD.SYSLMOD   DD   DISP=(NEW,CATLG),DSN=ooooooooLIB(oooooooo),
//     UNIT=ooooo,SPACE=(TRK,(1,1,1)),DCB=(DSORG=PO,RECFM=U)
```

This statement defines the output of the job as the system load module produced by the link-edit step. The data set name consists of two parts: the name of the load library, ending in "LIB", and the member name enclosed by parentheses. Unit is commonly specified as TSODA but can be modified, as can the data set name, to reflect the precise intention of the programmer.

```
//
```

The end of the job submission is marked by the null statement consisting of only two slashes in the first two positions of the card image.

Appendix J.--Source code module descriptions for monk seal data checking and utility programs. The source code is written in MOBOL, a Mohawk version of COBOL, or PL/1.

CONTENTS

	Page
Monk Seal Association Checking Program---RM009M01	102
Monk Seal Data Listing Utility Program--RM009M02	108
Monk Seal Verification Program--RM009M03	108
Monk Seal Sighting Selection Program--RM009M04	113
Monk Seal ID and Sighting List Program--RM009M05	114
Monk Seal Standardization Program--RM009M06	115
Monk Seal Short Reformatting Program--RM009M07	121
Monk Seal Multiple ID or Bleach Replacement Program--RM009M08	121
Monk Seal Haul Chart Program--RM009M09	122
Monk Seal ID List Formatting Program--RM015M01	127
Monk Seal ID List Checking Program--RM015M02	127
Monk Seal Census Data Formatting Routine--RM009T02	134
Monk Seal Census Data Renumbering Routine--RM009T03	135
Monk Seal Census Data Reverse Formatting Routine--RM009T04	137

Appendix J.--Continued.

Monk Seal Association Checking Program---RM009M01

Main Program — Begins at line 0000

Input: Names of input and output data files, supplied by operator, on the Mohawk fixed disk.

Procedure: After receiving information from the operator, successive pages of an input file are put into an array and processed. The observation date is set, and errors--such as incorrect record type and line numbers either outside the range 1-64 or duplicated within a page--are flagged by messages. The operator may cancel the run at a page break by pressing SELMODE; otherwise, at the end of the input file, the report trailer is printed and control is returned to the Mohawk system.

Output: Invokes modules 200 and 1000, variables PSEUDO TIME, OBS TYPE, LOG ENTRY (array) are set, printed messages may be produced.

Set Maximum Number of Lines for Page — Begins at line 200

Input: Invoked by main program, to operate on LOG ENTRY (array).

Procedure: Sequence numbers are adjusted to compensate for possible reordering of lines within the page during input, and the maximum number of lines is set.

Output: Variables MAXIMUM and MAXIMUM ORIG.

Process a Page of Data — Begins at line 1000

Input: Invoked by main program, to operate on the LOG ENTRY array.

Procedure: Lines containing only a line number are removed, and then after checking that behavior 0 (unassociated) does not appear on a continuation line, the continuation references within the page are resolved. Some other checks are made, such as detection of an uneven number of associations on the page, and the corrected page of data is written to the output file.

Output: Invokes modules 1100, 1200, 2000, 2200, and 3000. Variables NEXT ENTRY and HOLD REC are set, and an output file of corrected data is produced.

Appendix J.--Continued.

Resolve a Continuation Reference — Begins at line 1100

Input: Invoked by module 1000, with the variable NEXT ENTRY.

Procedure: The line referred to by the continuation line number, checked to be a valid line in the page, is compared to the current line, and information is copied from the original line to the continuation line. Explicitly coded information on the continuation line conflicting with the original line is detected. Changes made to the data are documented by a printed message.

Output: NEXT ENTRY may be modified; printed messages may be produced.

Check Associations When Page is Completed — Begins at line 1200

Input: Invoked by module 1000, with LOG ENTRY array.

Procedure: Neglecting blank or entanglement associations, the number of associations are counted. The same line number in both associations is detected. If two identical associations are present, one is removed. Behavior 0 is added to entries that have no associations coded and are not referred to by other entries.

Output: LOG ENTRY array may be modified, variable ASSOC TOTAL is set, and printed messages may be produced.

Resolve Associations for a Log Entry — Begins at line 2000

Input: Invoked by module 1000, with the variable NEXT ENTRY.

Procedure: After accumulating line numbers that are the same individual and after assuring that coded associations are not self-referential and are in the proper format, they are resolved against other log entries on the page.

Output: Invokes modules 2200, 2420 and 3000. Sets the variable WORK ASSOCIATION. Printed messages may also be produced.

Appendix J.--Continued.

Check for Proper Association Format — Begins at line 2200

Input: Invoked by module 1000 and 2000, with the variable WORK ASSOCIATION.

Procedure: If line number is not blank, distance must not be blank. Line number or behavior L or N may appear alone as a place holder. If line number or distance is present, behavior O or X must not be present.

Output: The variables ASSOC FORMAT OK and PLACE HOLDER are set. Printed messages may also be produced.

Accumulate Line Numbers of an Individual — Begins at line 2400

Input: Invoked by module 2000, with the variable NEXT ENTRY.

Procedure: All the entries in the page are scanned, and those related to NEXT ENTRY have their line number recorded in an array.

Output: The variable LIN ARRAY is set.

Resolve a Single Association — Begins at line 3000

Input: Invoked by module 1000 and 2000, with the variables NEXT ASSOCIATION and PSEUDO TIME available.

Procedure: The particular association isolated by the calling routine is resolved by locating the entry referenced. Reference to an unassociated individual or to a nonexistent line is detected. An explicitly coded association time not in agreement with the entry making the reference (or if blank, the previous time coded on the page) also is detected. Sector and beach position are limited depending on distance code. In searching the page for a counter association, continue lines (and original lines if a continue line is cited) are used if needed to find a matching association.

Output: Invokes modules 2200, 3300, and 3600. Sets variables SCAN ASSOCIATION, FILL FLAG, and others. Printed messages may also be produced.

Appendix J.--Continued.

Interrogate Counter-Association — Begins at line 3300

Input: Invoked by module 3000, with the variables NEXT ASSOCIATION and SCAN ASSOCIATION.

Procedure: The association identified as a possible counter-association is checked to refer to the line making the original reference, including reference via continuation lines. Distance codes also are compared.

Output: Invokes module 4000 and may produce printed messages.

Create New Continuation Entry with Location Reference — Begins at line 3600

Input: Invoked by module 3000, with the variables SCAN ENTRY, SCAN ORIG, and MAXIMUM available.

Procedure: Called if no space exists in the page of data as originally coded for an additional counter-association reference; a new line is added at the bottom of the page, and the appropriate location reference is filled in.

Output: Printed messages are produced.

Resolve Passive Behaviors — Begins at line 4000

Input: Invoked by module 3300, with the variables NEXT ASSOCIATION and SCAN ASSOCIATION.

Procedure: All behavior codes are checked for correctness, then depending on which behaviors are coded, different actions are taken. Active behaviors are processed by a subroutine. Behavior N causes checking for a mutual association between the two lines linked by the behavior. If half the mutual association is blank or contains only the correct line number or only an N, the association is completed, and flags are set so a message will be printed out. Other behaviors require an L behavior as half of a mutual association and are also completed by filling in, if possible, line number, distance, and behavior L.

Output: Invokes modules 4200 and 4400, SCAN ENTRY may be modified, FILL FLAG and SATISFIED are set, and printed messages are produced.

Appendix J.--Continued.

Behavior Code Check — Begins at line 4200

Input: Invoked by module 4000, with the variables WORK BEHAV and REF.

Procedure: If the two-position WORK BEHAV matches one of the expected behavior codes, no action is taken. If not, the variable REF is set to the behavior code.

Output: Variable REF only.

Check Active Behavior Codes — Begins at line 4400

Input: Invoked by module 4000.

Procedure: An active behavior is present, and all four behavior codes in the association are considered.

Output: Invokes module 5000, with the variable WORK BEHAV.

Check a Single Active Behavior — Begins at line 5000

Input: Invoked by module 4400, with the variable WORK BEHAV.

Procedure: Behavior codes beginning with J or P require matching codes in both halves of a mutual association. Behavior codes beginning with C or D require a countering F behavior in half of a mutual reference. Other behavior codes are not processed here.

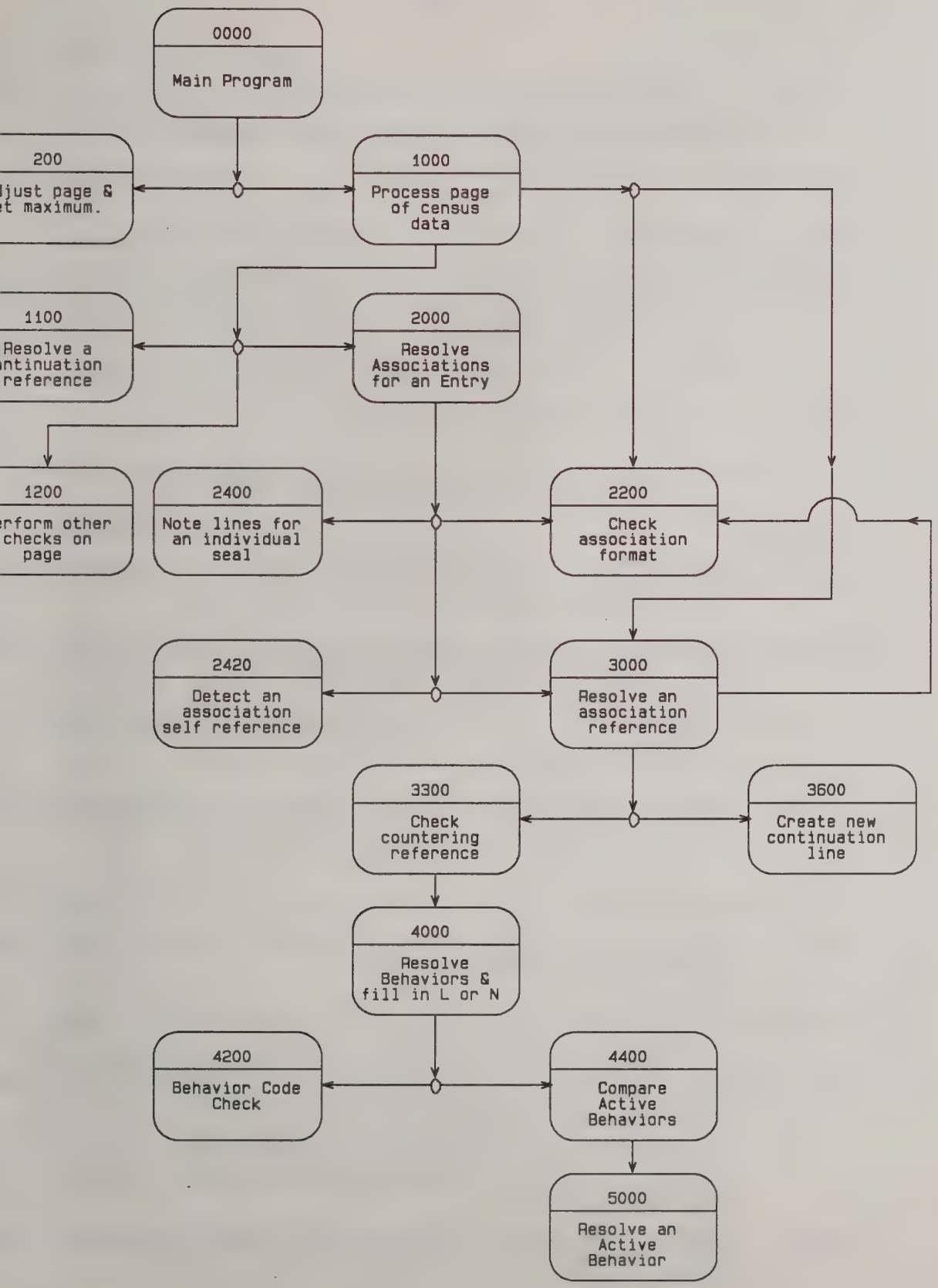
Output: Variable SATISFIED is set; printed messages may be produced.

Support Operator Interface — Begins at line 8000

Input: Data set names provided by the operator.

Procedure: The input data file is opened, island and year are ascertained, and run date is accessed from the system date. The output file and printer are opened, and the report header is printed.

Monk Seal Association Checking Program - RM009M01



Appendix J.--Continued.

Monk Seal Data Listing Utility Program--RM009M02

Main Program — Begins at line 0000

Input: Name of data file or ID list supplied by operator.

Procedure: The file selected by the operator is opened and checked as to whether it is an ID list or data file. The appropriate heading is printed, and then the records of the file are printed, with record numbers to their right. Afterwards, a report trailer is printed, and control is returned to the operating system.

Output: The printed listing is produced.

Monk Seal Verification Program--RM009M03

Main Program — Begins at line 0000

Input: Data set name, provided by operator, of a file of data on the Mohawk's fixed disk.

Procedure: The operator interface is activated, then as the input file is read, record type (type 1: page header; type 2: line entry) determines which checking routines are invoked. Unless interrupted by the operator at the end of file, the file is closed, a report trailer is printed, and control is returned to the Mohawk system.

Output: Invokes modules 1000, 2000, and 7000; sets variables TYPE ONE, TYPE TWO, CRITERIA.

Validate Record Type One — Begins at line 1000

Input: Invoked by main program with the variables TYPE ONE, GROUP INFO, OBSERVERS, DATA TYPES, and ISLAND.

Procedure: PRINT FLAG is initialized to zero to show that the current record has not yet been printed. Source ID and island codes are checked. Observers' initials, begin and end time, page numbering, agreement between pages in a page group (which should be together but may be in any order), observation day, data type, temperature, wind direction and strength, cloud cover, and precipitation also are checked for proper values. Unique observers' initials and data types are collected as needed for the report trailer.

Output: Invokes modules 4000, 7000, and 8200. Modifies variables WORK TIME, CRITERIA, and IMP ITEM.

Appendix J.--Continued.

Validate Record Type Two — Begins at line 2000

Input: Invoked by main program, with the variables TYPE TWO and PREVIOUS LINE.

Procedure: PRINT FLAG is initialized to zero. Line number is checked to be one greater than that immediately previous. Size, sex, questionable fields, tag color and position, beach position, molt, disturbance, time, associations, continue and notes fields are checked for proper values.

Output: Invokes modules 3200, 3300, 4000, 5000, 6000, and 7000. Sets the variable CRITERIA.

Known Seal Check — Begins at line 3200

Input: Invoked by module 2000, with the variable TYPE TWO.

Procedure: If any method of identification is nonblank and is not uncertain, the seal is known. All methods of identification must then agree that the seal is known.

Output: Invokes module 7000, sets the variables KNOWN SEAL and CRITERIA.

Check UnIDed and Untagged Seals — Begins at line 3300

Input: Invoked by module 2000 with the variable TYPE TWO.

Procedure: A zero in the questionable column is inconsistent with any nonblank ID or tag entry. A complete tag entry must have number, position, and color.

Output: Invokes module 7000, sets the variable CRITERIA.

Time of Day Check — Begins at line 4000

Input: Invoked by modules 1000, and 2000, with the variable WORK TIME.

Procedure: TIME OK is initialized to one. If HOURS are within a 0-24 range, and MINUTES are within a 0-59 range, and WORK TIME is not all zeros nor greater than 2400, the routine terminates. Otherwise, TIME OK is set to zero.

Output: The variable, TIME OK.

Appendix J.--Continued.

Association Validation Routine — Begins at line 5000

Input: Invoked by module 2000, with the variables INPUT BUFFER, WORK ASSOCIATION, ASSOCIATION FLAG, and NURSING PUP FLAG.

Procedure: Line number in the association is checked to not refer to the current line (both line number and distance should be present if one is present) and be either 98 or 99 or within a range of 1 to 64, and line number is present when behaviors other than O, X, or unassociated Z are present. Distance code is checked for a proper value. Depending on behaviors in the data, different checks are made of size and sex codes on the current line, or line number or distance may be further constrained. For unweaned pups, one association should contain a nursing behavior.

Output: Invokes modules 5100, and 7000. Uses variables WORK BEHAV and CRITERIA.

Behavior Code Check — Begins at line 5100

Input: Invoked by module 5000, with the variable WORK BEHAV.

Procedure: The two-character behavior code isolated by the calling routine is checked for membership in the set of allowable codes.

Output: Invokes module 7000, with the variable CRITERIA.

Sector Validation Routine — Begins at line 6000

Input: Invoked by module 2000, with the variables ISLE and SECTOR.

Procedure: If SECTOR is blank or 99, SECTOR OK is set to 1. If SECTOR is less than one, SECTOR OK is set to zero. If SECTOR belongs to the set of sectors established for ISLE on the page header for the entry being processed, SECTOR OK is set to one. Otherwise, SECTOR OK is set to zero.

Output: The variable, SECTOR OK.

Appendix J.--Continued.

Print Routine — Begins at line 7000

Input: Invoked by modules 1000, 2000, 3200, 3300, 5000, and 5100, with the variables PRINT FLAG, INPUT BUFFER, INPUT INDICATOR, CRITERIA, and NOTICE.

Procedure: PRINT BUFFER is first set to all blank characters. If PRINT FLAG is zero, INPUT BUFFER is put into the print buffer with a sequence number derived from INPUT INDICATOR, and PRINT FLAG is set to one. CRITERIA determines a particular message in the NOTICE message table that is to be put into the print buffer and is then printed.

Output: Only printed messages are produced.

Support Operator Interface — Begins at line 8000

Input: Filename is provided by operator.

Procedure: The printer and input file are opened; island, year, and run date are set; the report heading is then printed.

Output: Printed report header is produced.

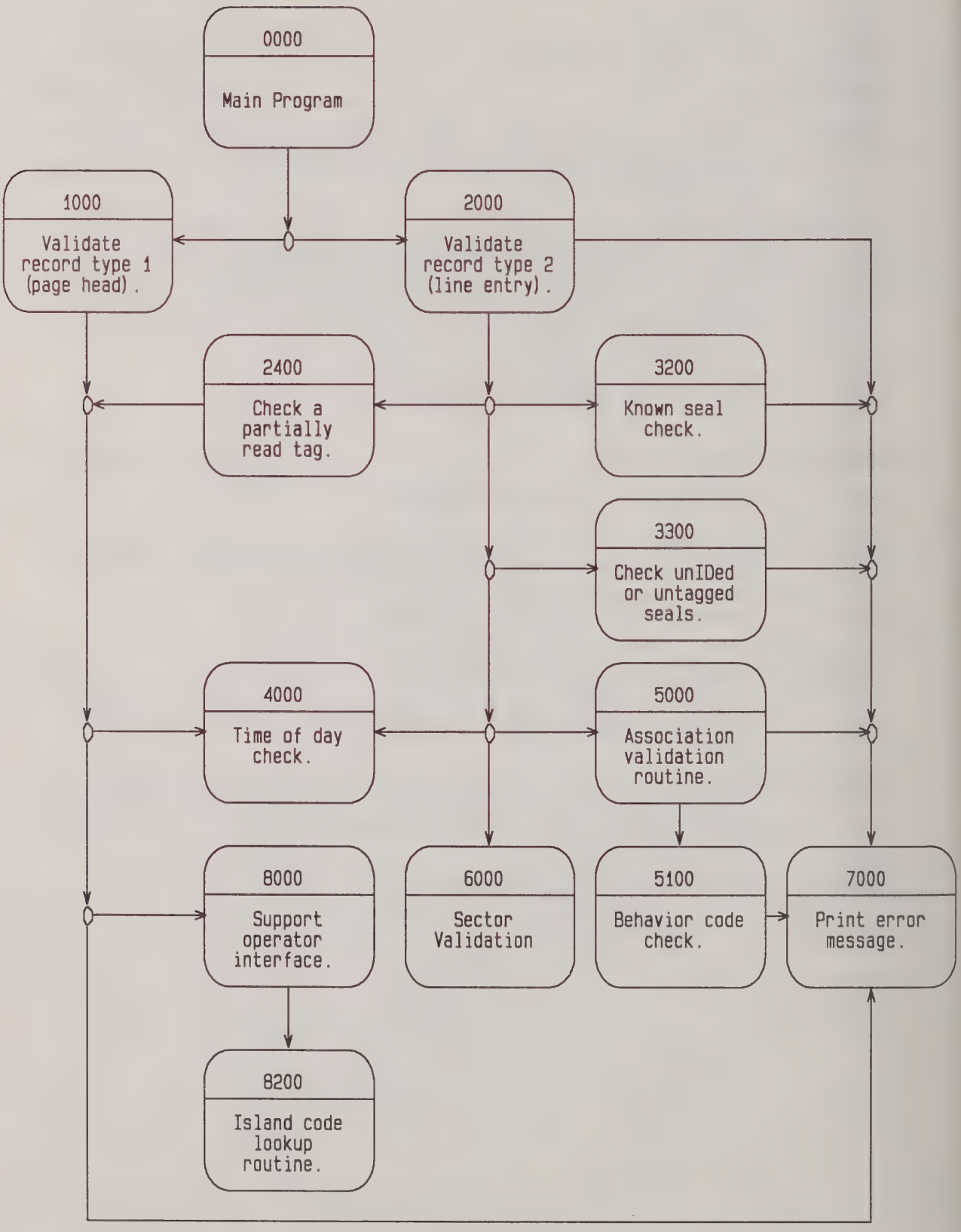
Island Code Lookup Routine — Begins at line 8200

Input: Invoked by main program, and module 1000, with the variable IMP ITEM.

Procedure: ISLE NAME is initialized to "UNKNOWN". The value of IMP ITEM determines island name according to the set of codes established for this purpose.

Output: The variable ISLE NAME is set.

Monk Seal Verification Program - RM009M03



Appendix J.--Continued.

Monk Seal Sighting Selection Program--RM009M04

Main Program — Begins at line 0000

Input: Input file of data from which sightings are to be extracted.

Procedure: The records of the input file are read. Record type 1 is scanned for island, date, and batch number; record type 2 is scanned for ID, bleach, tag, and sequence number. As the sightings are encountered, they are condensed into a compact format and written to a work file. After all the input records have been processed, files are closed, and control is returned to the operating system.

Output: The output file containing the condensed sightings from the data file is produced.

Support Operator Interface — Begins at line 8000

Input: Name of input and output data sets provided by operator.

Procedure: After the input file is opened, island, year, and run date are displayed to the operator. The output file is also opened.

Output: The operator display and the opened files.

Appendix J.--Continued.

Monk Seal ID and Sighting List Program--RM009M05

Main Program — Begins at line 0000

Input: The sighting file, containing the condensed sighting extracted from the data file by the sighting selection program (RM009M04), and the sort index generated by the Mohawk system sort (SORTM).

Procedure: The sightings are read and formatted into blocks of 10 sightings per individual seal across the page. Each block contains the date, size and sex classifications, sequence number, and indicators for molt and nursing behavior. An asterisk is added to sightings in excess of one per day per seal.

Output: Invokes module 2000. The printed sighting list is produced, with the various identification modes against the left margin and the sightings extending to the right.

Print and Clear Sighting Array — Begins at line 2000

Input: Invoked by main program.

Procedure: A single set of 10 sighting blocks is formatted onto the printed page, then printed and reset to all blanks.

Output: Printout of one group of up to 10 sightings for a particular seal.

Support Operator Interface — Begins at line 8000

Input: Filenames of the sighting file and the sort index.

Procedure: The files are opened; island, year, and run date are displayed; the printer is opened; and the report header is printed.

Output: The printed header and the files ready to be accessed.

Appendix J.--Continued.

Monk Seal Standardization Program--RM009M06

Main Program — Begins at line 0000

Input: Names of input (unstandardized) and output (standardized) data files, name of ID list, supplied by operator, on the Mohawk fixed disk.

Procedure: After receiving information from the operator, successive pages of an input file are put into an array and processed. The observation date is set, and errors--such as incorrect record type and line numbers either outside the range of 1-64 or duplicated within a page--are flagged by messages. The operator may cancel the run at a page break by pressing SELMODE; otherwise, at the end of the input file, the report trailer is printed, and control is returned to the Mohawk system.

Output: Invokes module 1000, variables OBS DATE and LOG ENTRY (array) are set, and printed messages may be produced.

Process a Page of Data — Begins at line 1000

Input: Invoked by main program, to operate on the LOG ENTRY array.

Procedure: The source ID code is checked and changed to "RM009AC1" on the header record for page of data, then each line is processed. Blank, nonsighting, or turtle entries are bypassed; the rest are standardized. The page is finally written to an output file.

Output: Invokes module 2000, variables NEXT ENTRY and HOLD REC are set, and an output file of standardized data is produced.

Appendix J.--Continued.

Standardize a Single Log Entry — Begins at line 2000

Input: Invoked by module 1000; variables NEXT ENTRY and HOLD REC are accessed.

Procedure: Several flags are initialized, identification codes in the data are prepared, then the ID list is searched by ID, bleach, tag, or nursing ID. When a record in the ID list has been selected, other modules are invoked to complete the process of standardization.

Output: Invokes modules 2200, 2300, 3000, 4000, 5000. Variables NEXT ENTRY, HOLD REC, and ID LIST EXHAUSTED are modified; printed messages may be produced.

Right Justify ID, Bleach, or Tag if Needed — Begins at line 2200

Input: Invoked by module 2000; variables in NEXT ENTRY and ID PREFIX are accessed.

Procedure: The ID coded in a data entry is prepared to be right justified, beginning with the letter prefix for the island from which the data originated. A warning message appears if a tag color in the data mismatches the default prefix. Character positions between the original ID and the prefix are filled with zeros. Bleach and tag numbers are also right justified. Changes to the data are documented by advisory messages.

Output: Variable NEXT ENTRY is modified.

Conform a pup's continuation line — Begins at line 2300

Input: Invoked by module 2000, to operate on NEXT ENTRY.

Procedure: NEXT ENTRY, determined to be a continuation, is conformed to the original line with regard to size, sex, ID, bleach, and tag. If the continuation refers to a line below it on the page (i.e., one with a higher line number that may not be standardized), a warning message is produced. Any change in the data is documented by an advisory message.

Output: Printed messages; variable NEXT ENTRY may be modified.

Appendix J.--Continued.

Observation Date Check — Begins at line 3000

Input: Invoked by module 2000, with the variables NEXT ENTRY, REF REC, and OBS DATE available.

Procedure: Birth date in the ID list should be earlier than an observation date from a page of data being processed. Wean date in the ID list requires a size of P before wean date and a W after. Molt dates in the ID list also checked against molt information in the data record NEXT ENTRY.

Output: Printed messages only.

Standardize Identification — Begins at line 4000

Input: Invoked by module 2000, with the variables NEXT ENTRY, REF REC, SCAN FLAG, and ID LIST EXHAUSTED.

Procedure: The questionable code fields are checked for consistency. If blank in the data, the ID, bleach, and tag numbers are added from the ID list. If the bleach number differs from that in the ID list and the ID list has not been exhaustively searched, control is returned to module 2000 so the best possible match may be found. When the ID, bleach, or tag number is modified, the appropriate questionable field is modified if it is not "0". SCAN FLAG indicates whether NEXT ENTRY is being standardized on its own information (questionable set to "2") or as a result of a nursing association (questionable set to "3"), or because a unique match on the ID list with partial tag information permitted the tag fields to be completed (questionable set to "4"). Explicitly coded data conflicting with the ID list, and changes made to data are flagged by messages.

Output: Invokes modules 4200 and 4400; modifies variables NEXT ENTRY, HOLD REC, LEVEL, and WORK TAG; and produces printed messages.

Determine Tag Completeness and Uniqueness — Begins at line 4200

Input: Invoked by module 4000, with the variables WORK TAG and REF REC.

Procedure: The tag information coded in the data is checked for completeness in terms of having a tag number, position, and color. If the tag information is only partial, it is checked against the record from the ID list to determine whether a unique tag can be determined.

Output: Variables PARTIAL TAG and UNIQUE TAG are set. A printed message also may be produced.

Appendix J.--Continued.

Tag Matching Routine — Begins at line 4400

Input: Invoked by module 4000, with the variables WORK TAG, REF REC, LEVEL, NEXT ENTRY, and SCAN ENTRY.

Procedure: The work tag from the data isolated in module 4000 is compared to the three tags coded in the ID list. To make as complete a match as possible, WORK TAG is modified. Conflicting information is detected. LEVEL defines whether NEXT ENTRY or SCAN ENTRY is being used. FLAG is set to two to reflect a mismatch.

Output: Variables WORK TAG and FLAG; printed messages.

Standardize Size and Sex — Begins at line 5000

Input: Invoked by module 2000, with the variables NEXT ENTRY, REF REC, and FLAG.

Procedure: If FLAG is set to one, a mismatch occurred with the record selected from the ID list, and no action is taken. If sizes in the data and the ID list are P and/or W, the data are not changed. If one size is A and the other is J, a warning message is produced. Otherwise, if the two sizes are different, data are "standardized" to those data used in the ID list. Sex is also added from the ID list if there is no conflict.

Output: NEXT ENTRY may be modified; printed messages are produced.

Cache Lookup Routine — Begins at line 6000

Input: Invoked by module 2000, with the variables CACHE KEY, NEXT ENTRY, and SCAN ENTRY.

Procedure: A sequential search of the cache is performed, with CACHE KEY determining whether ID, bleach, tag, or nursing ID number in the SCAN ENTRY referred to by a pup's nursing association is considered. If a match is found, CACHE HIT is set to one, and REF REC is set up as if it had been read from the ID list file. Otherwise, CACHE HIT is set to zero.

Output: Variables CACHE HIT and REF REC only.

Appendix J.--Continued.

Refresh Cache Routine — Begins at line 6200

Input: Invoked by module 2000, with the variables CACHE POINTER and REF REC.

Procedure: CACHE POINTER is moved to the next position in a circular cache, and the most recently read entry from the ID list is copied in.

Output: Variable CACHE BUF.

Support Operator Interface — Begins at line 8000

Input: Filenames of input and output data files and ID list, provided by operator.

Procedure: First, the input data file is opened, and the island and year are displayed. The default ID letter prefix is set, and the run date fetched from the system. When the names of the output data file and ID list are keyed, the files are opened, and the ID list is checked to have the same island and year as the data. The printer is opened, and the report header is printed.

Output: Invokes module 8100, printed header, and prepared files for processing.

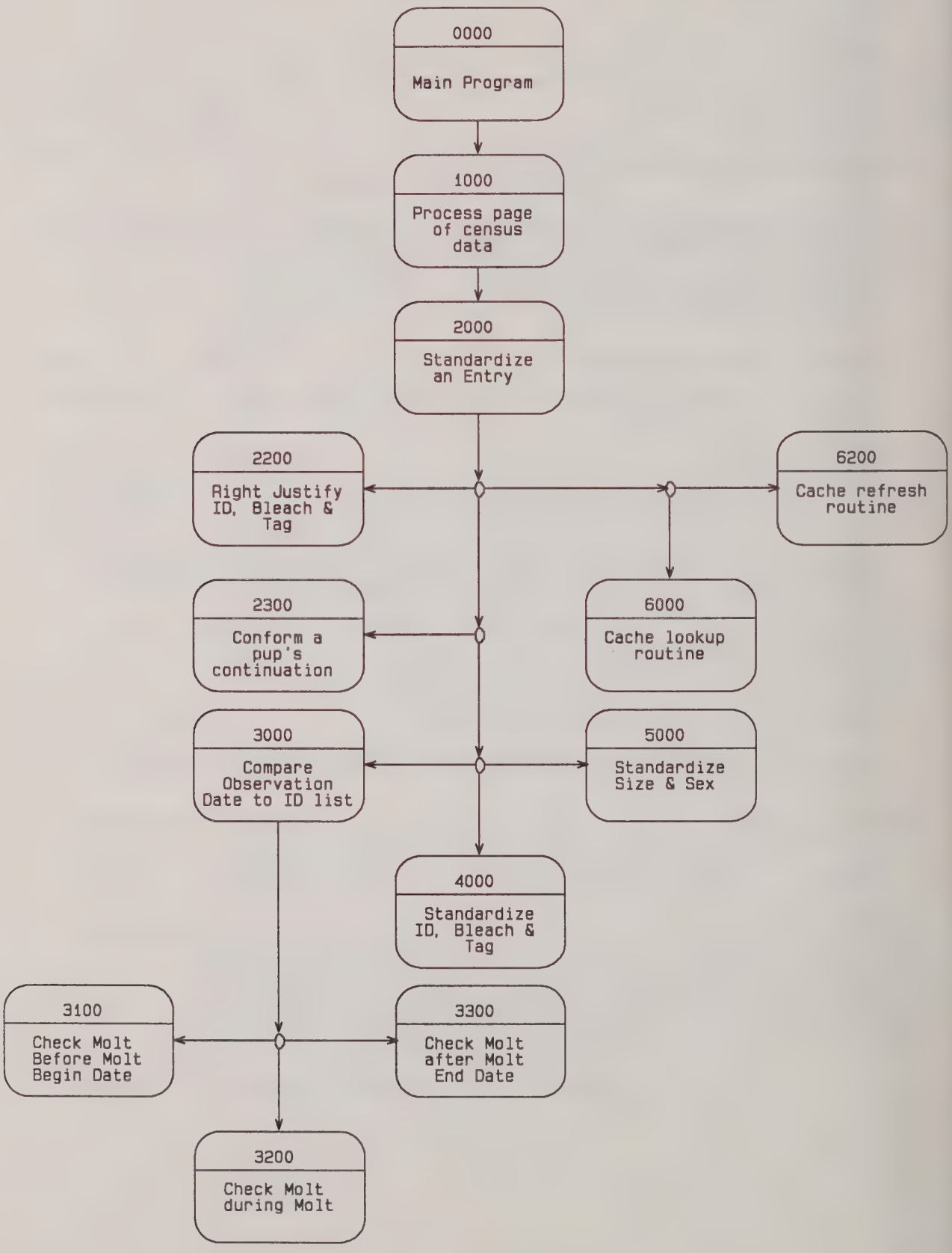
Translate Island Code Into Island Name — Begins at line 8100

Input: Invoked by module 8000, with the variable IMP ITEM set to island code.

Procedure: Island name is set, based on the island code.

Output: Variable ISLE is set.

Monk Seal Standardization Program - RM009M06



Appendix J.--Continued.

Monk Seal Short Reformatting Program--RM009M07

Main Program — Begins at line 0000

Input: A file of monk seal census data, either RM009AA1 or RM009AB1.

Procedure: As the records are read, island, date, and data type are copied from each record type 1 onto the type 2 records that follow it, and the modified type 2 records are written to an output file.

Output: A data file that can be transferred from the Mohawk and used by the census summary programs on the Molecular system.

Support Operator Interface — Begins at line 8000

Input: Names of both input and output files provided by the operator.

Procedure: The files are opened.

Output: The open files; ready for processing.

Monk Seal Multiple ID or Bleach Replacement Program--RM009M08

Main Program — Begins at line 0000

Input: The filename of the census data on which it is desired to perform the replacements, and the user-selected option indicating whether ID or bleach fields are to be replaced, and up to 10 sets of old and new ID or bleach numbers.

Procedure: Occurrences of the old ID or bleach numbers are replaced with the new ID or bleach numbers throughout the data file. A running count is kept of the number of replacements.

Output: The updated data file.

Appendix J.--Continued.

Monk Seal Haul Chart Program--RM009M09

Main Program — Begins at line 0000

Input: User-selected functional option (i.e., add sightings to haul chart or print chart).

Procedure: After accepting the functional option, a second screen is presented to the user to obtain the name of the haul chart. If the chart is new, the names of the ID list and data files are required. Depending on the option, either one of two subroutines is invoked.

Output: Invokes modules 100 or 5000.

Add All Sightings to Haul Chart — Begins at line 100

Input: Invoked by main program

Procedure: Using an index variable, each of the 39 data filenames that could be entered by the operator is processed by a subsidiary subroutine.

Output: Invokes module 300.

Add Sightings From One File to Haul Chart — Begins at line 300

Input: Invoked by module 100, with the variable FIL NDX.

Procedure: After opening the data file, successive records are read; each record type 1 is scanned for the observation date, which is converted to a Julian date between 1 and 366; each record type 2 for each page is placed into an array identical to the association checking and standardization programs.

Output: Invokes module 1000.

Appendix J.--Continued.

Process a Single Page of Census Data — Begins at line 1000

Match a Sighting With a Record in the ID List — Begins at line 2000

Right Justify ID or Bleach in Data — Begins at line 2200

Ensure Identification Matches Sighting as Closely as Possible — Begins at line 3000

Check that Tag Matches Tag(s) on ID List — Begins at line 3300

Note: The above modules are identical to, and in fact were copied from, correspondingly numbered modules in the standardization program (RM009M06).

Add a Sighting to the Haul Chart — Begins at line 4000

Input: Invoked by module 2000, with the variables REF REC and NEXT ENTRY.

Procedure: The existing line in the haul chart for the record in the ID list is retrieved, then the symbol used for the particular observation date is determined, based on molt information, presence of nursing behavior, and the questionable fields of ID, bleach or tag. The updated line in the haul chart is then written back to disk.

Output: Updated record in haul chart.

Print Haul Chart — Begins at line 5000

Input: Invoked by main program.

Procedure: A haul chart summary is printed, followed by the haul chart itself in a cycle of three pages for every 60 individual seals. The records of the haul chart are merely read and printed out unmodified, aligned on the pages so that column positions correspond to the dates printed across the top of each page.

Output: Invokes modules 5200, 5400, and 5600.

Appendix J.--Continued.

Print Haul Chart Summary — Begins at line 5200

Input: Invoked by module 5000.

Procedure: The screen image is printed, showing the names of the data files and name of the ID list used in constructing the haul chart. Each record from the ID list is retrieved, along with the matching line from the haul chart, and the various forms of identification are printed along with dates derived from the haul chart, such as first and last sighting dates and first and last molt dates. Special indicators are printed if a noncontinuous molt or nursing period is detected, if the molt duration >15 d, or if an individual seal on the ID list had not been sighted or has molt dates on the ID list but was not seen molting.

Output: Printed summary is produced. Invokes module 5400.

Convert Julian Day to Month & Day — Begins at line 5400

Input: Invoked by module 5200, with the variable JULIAN DAY.

Procedure: Month and day are set to appropriate values, depending on the value of the Julian day determined from the haul chart, so that it may be printed out by the calling module.

Output: Sets variables MONTH and DAY.

Detect Non-Continuous Molt or Nurse — Begins at line 5600

Input: Invoked by module 5200, with the variables MOLT BEGIN, MOLT END, FIRST P, and LAST P.

Procedure: The segment of the haul chart line for an individual seal between the two most widely separated molt symbols, if present, is scanned for intervening sightings in which molt is not observed. If nursing behaviors are present, a similar process is undertaken.

Output: Sets variable NON CONTINUOUS M OR P.

Appendix J.--Continued.

Support Operator Interface — Begins at line 8000

Input: Invoked by main program.

Procedure: The haul chart data set is opened and checked for any pre-existing data. If the chart is empty, after the name of the ID list is keyed, it is initialized to all blanks. If the chart has been filled in, the user option (add sightings to haul chart or print haul chart) determines whether the user will key names of additional data files or press "ENTER" to begin printing chart. When the ID list is opened, it is also checked for proper sequence numbering. Island and year are displayed for the user and checked to match data, ID list, and haul chart. The default ID letter prefix, used when ID numbers less than four characters occur in the data, is determined.

Output: Invokes modules 8100, 8200, and 8300.

Translate Island Code into Island Name — Begins at line 8100

Input: Invoked by module 8000, with the variable IMP ITEM, taken from either the haul chart, ID list, or data file.

Procedure: The island code determines the name of the island or atoll for which the particular haul chart is being compiled.

Output: The variable ISLE is set.

Check ID List — Begins at line 8200

Input: Invoked by module 8000.

Procedure: The filename given by the operator as an ID list is checked to ensure that it is an ID list that has been formatted and that editing has not impaired the sequence numbering used to match the records in the haul chart with the records in the ID list.

Output: Any of a number of messages may be displayed on the operator's screen.

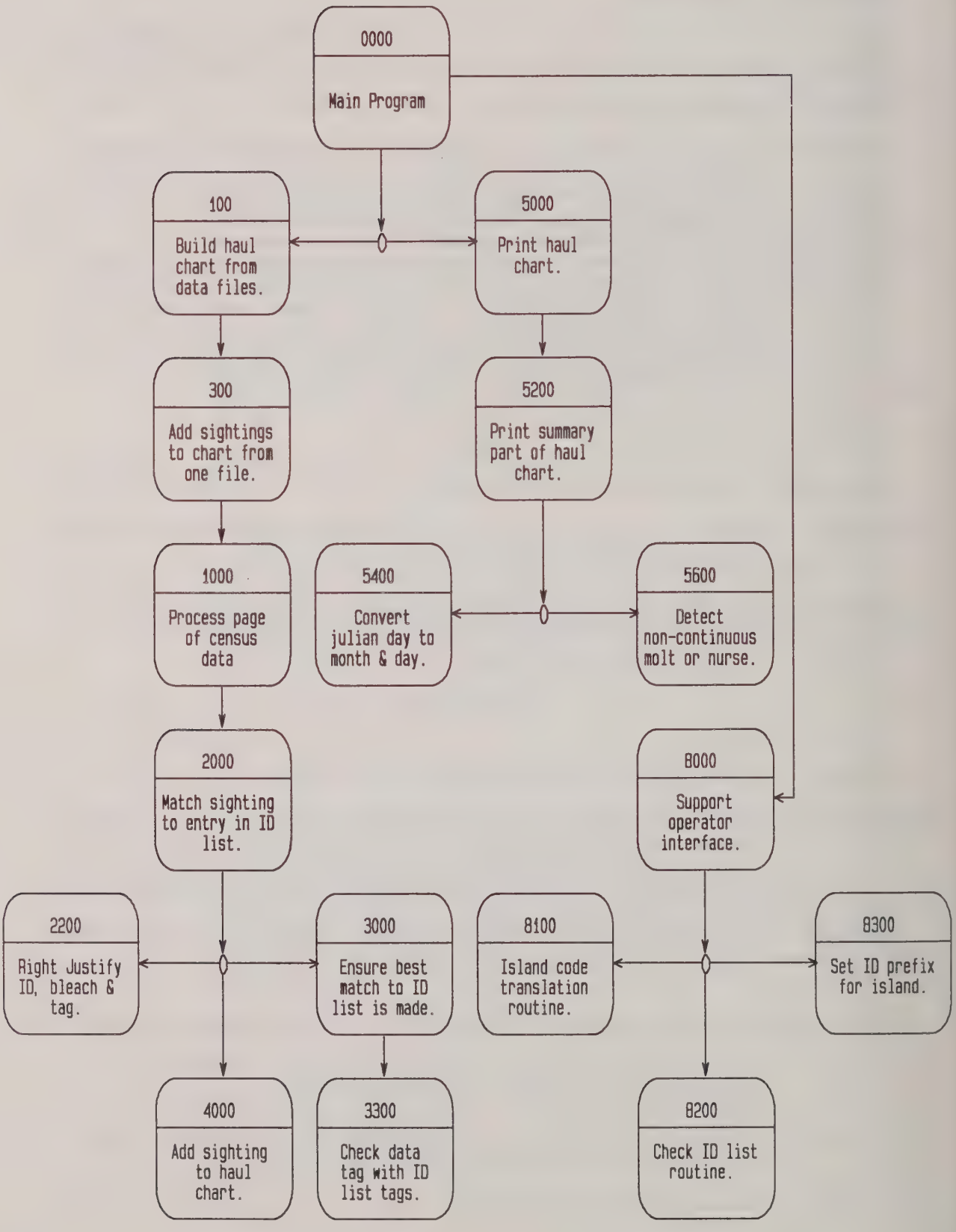
Set ID Letter Prefix Default Value — Begins at line 8300

Input: Invoked by module 8000, with the variable IMP ITEM set to appropriate island code for the haul chart.

Procedure: Island code determines the proper ID letter prefix in much the same way as island name is determined.

Output: Variable ID PREFIX is set.

Monk Seal Haul Chart Program - RM009M09



Appendix J.--Continued.

Monk Seal ID List Formatting Program--RM015M01

Main Program — Begins at line 0000

Input: A monk seal ID list in original form (RM015AA1), or one that has already been formatted (RM015AB1).

Procedure: The operator interface is activated, and when the input and output filenames are provided, island, year, and run date are displayed. Source ID code in the input file is checked, and if the list is in original form, it is formatted; otherwise, it is merely renumbered. Execution is terminated when the input file is exhausted.

Output: The output file, in proper format for use in the standardization or haul chart programs (RM015AB1).

Monk Seal ID List Checking Program--RM015M02

A token records the conditions encountered when checking a monk seal ID list. Tokens are stored in a queue until the current ID list is completely checked, and the messages associated with the tokens are printed out.

The queue is partitioned in two by a special marker, the first part for intra-ID list checking and the second for inter-ID list checking.

Each bit within the two-byte token has significance, depending on the part of the queue in which it is found, and a single token may contain up to 13 messages.

Checking Current ID List Against Previous ID Lists:

Position of set bit	Token in hexadecimal	Message appearing in report
1	0001	Old ID not on any previous ID list
2	0002	New ID also in xxxxxx record nnnn
3	0004	Tag different in xxxxxx record nnnn
4	0008	Size larger in xxxxxx record nnnn
5	0010	Sex different in xxxxxx record nnnn
6	0020	Duplicate tag in xxxxxx record nnnn
7-16	0040-8000	(Reserved)

Appendix J.--Continued.

Checking Within Current ID List:

Position of set bit	Token in hexadecimal	Message appearing in report
1	0001	Improper size
2	0002	Improper sex
3	0004	Improper tag color
4	0008	Improper tag position
5	0010	Nursing ID must refer to A F
6	0020	Improper ID number
7	0040	Nursing ID not on ID list
8	0080	Nursing ID present requires size P or W
9	0100	Duplicate ID on record nnnn
10	0200	Duplicate tag on record nnnn
11	0400	Molt end date earlier than begin date
12	0800	Wean date earlier than birth date
13	1000	Birth or wean date for non-pup
14-16	2000-8000	(Reserved)

Main Program — Begins at line 0000

Input: Information from operator interface, including names of ID lists and SELECTED OPTION.

Procedure: The operator interface is activated; names of the ID lists are accepted and screened for validity. The index OFFSET is initialized, and then subroutines are used to perform checking within the current ID list and to compare the entries to those in previous ID lists. The results are printed and execution terminated.

Output: Invokes modules 1000, 5000, and 6000.

Compare ID List to Previous Lists — Begins at line 1000

Input: Invoked by main program, with the variable USER FLAG.

Procedure: If USER FLAG is one, no action is performed. A USER FLAG of two or three indicates checking current ID list against previous lists is desired, and successive entries in the current ID list are processed, except those with a blank ID. The operator, by pressing SELMODE, may terminate processing and return control to the main program. The end of the QUEUE AREA is marked with a special flag.

Output: Invokes module 2000, with the variable CUR REC.

Appendix J.--Continued.

Search Previous Lists for a Matching ID — Begins at line 2000

Input: Invoked by module 1000, with the variable CUR REC.

Procedure: FIL NDX is used to select successive, previous ID lists from the array of previous lists and search each one for a matching ID. Each search begins at the record after the last matching record was found. If a search is unsuccessful, this position is not changed; if successful, it is updated. When all previous ID lists are searched and a matching ID is not found, the "new" field from the current ID list is checked to be "1". Otherwise, appropriate information is stored in the queue area to be printed later in message form. If the "new" field is blank, the token is modified to reflect that an "old" ID should appear on a previous ID list.

Output: Invokes modules 3000 and 4200, and modifies the variables SATISFIED, and TOKEN.

Search a Single List for a Matching ID — Begins at line 3000

Input: Invoked by module 2000, with the variables TOKEN, CUR REC, and PREV POSITION.

Procedure: The previous ID list is read until an ID field matching that in the current ID list is found (in which case SATISFIED is set to one) or the previous ID list is exhausted. Because the search may begin anywhere in the previous list, it "wraps around" from the end to the beginning of the file, with PREV POSITION marking its logical end.

Output: Invokes modules 4000 and 4200; modifies the variables TOKEN and SATISFIED.

Check Tags, Size, and Sex — Begins at line 4000

Input: Invoked by module 3000, with the variables TOKEN, CUR REC, and PREV REC.

Procedure: A record in the current ID list is compared to a record in a previous list, and TOKEN is modified if an undesirable condition is detected. Each tag in the record from the current ID list should be in the record from the previous ID list. Size should be smaller or equal in the previous ID list. Sex recorded in each of the two lists should match.

Output: Invokes module 4200; modifies the variable TOKEN.

Appendix J.--Continued.

Queue Message Packet — Begins at line 4200

Input: Invoked by modules 2000, 3000, and 4000, with the variables TOKEN, QUEUE AREA, OFFSET, CUR POSITION, and PREV POSITION.

Procedure: TOKEN determines the message(s) selected during checking. If it does not have a value of binary zero, it is stored in QUEUE AREA, along with applicable record numbers from the current and previous ID lists.

Output: Modifies variables OFFSET and QUEUE AREA.

Print Results — Begins at line 5000

Input: Invoked by main program, with the variable QUEUE AREA.

Procedure: The operator is prompted to make the printer available if it is not. A heading is printed from the operator's screen, followed by results of checking the current ID list, first from internal checks within it and then from checking it against previous ID lists. QUEUE ITEMs are recovered from the QUEUE AREA, containing the information to reconstruct the necessary messages.

Output: Invokes modules 5100, 5200, and 5300. Printed report.

Print a Line for Intra-ID List Results — Begins at line 5100

Input: Invoked by module 5000, with the variables PRINT FLAG and CUR REC.

Procedure: A printed line is assembled and printed according to a predetermined format. If PRINT FLAG is one, the record has already been printed and, therefore, is not printed again.

Output: Printed messages.

Appendix J.--Continued.

Print a Line for Inter-ID List Results Begins at line 5200

Input: Invoked by module 5000, with the variables PRINT FLAG, SUB SEL, FILE FLAG, NUM AREA, and NUM NDX.

Procedure: A printed line is assembled and printed according to a predetermined format. If PRINT FLAG is one, the record has already been printed and, therefore, is not printed again. FILE FLAG indicates which of the previous ID lists is involved, and NUM NDX is used to retrieve from NUM AREA a record number, which is the record number in the previous ID list.

Output: Printed messages; PRINT FLAG and NUM NDX.

Print a Bar to Separate Segments of the Report Begins at line 5300

Input: Invoked by module 5000.

Procedure: Two blank lines are printed, followed by a line of dashes with exclamation marks delineating the areas in the report for the record, message, and record number. Column headings are printed, followed by another line, like the first, and two blank lines.

Output: Printed heading.

Check Within Current ID List Begins at line 6000

Input: Invoked by main program, with the variables USER FLAG, NUM AREA, NUM NDX, and CUR LIST.

Procedure: The successive records in the current ID list are read and checked for proper size, sex, tag color, and tag position. The ID field is scanned to see that it does not contain any internal blanks. Dates of molt, birth, and weaning also are checked. Each record is checked against the remainder of the list for duplicate ID, bleach, or tag information. If nursing ID is present, size should be P or W, and the nursing ID should also be a main entry in the ID list. This module associates a TOKEN within IN VECTOR as a method of storing the various conditions that may be detected.

Output: Invokes module 6200, IN VECTOR, NUM AREA, and NUM NDX.

Appendix J.--Continued.

Set Token for Duplicate ID or Bleach — Begins at line 6200

Input: Invoked by module 6000, with the variables TOKEN, NUM AREA, and NUM NDX.

Procedure: The TOKEN being assembled is set to indicate the detection of a second record within the ID list having an identical ID or bleach field. The record number associated with the possible duplicate is stored also for retrieval during printing.

Output: TOKEN, NUM AREA, and NUM NDX.

Stack Message Onto Message Queue — Begins at line 6400

Input: Invoked by module 6000.

Procedure: Because a duplicate identification has been detected, the numbers of the records involved, along with the message token, are stored in the message queue to be printed after checking is completed.

Output: The updated message queue.

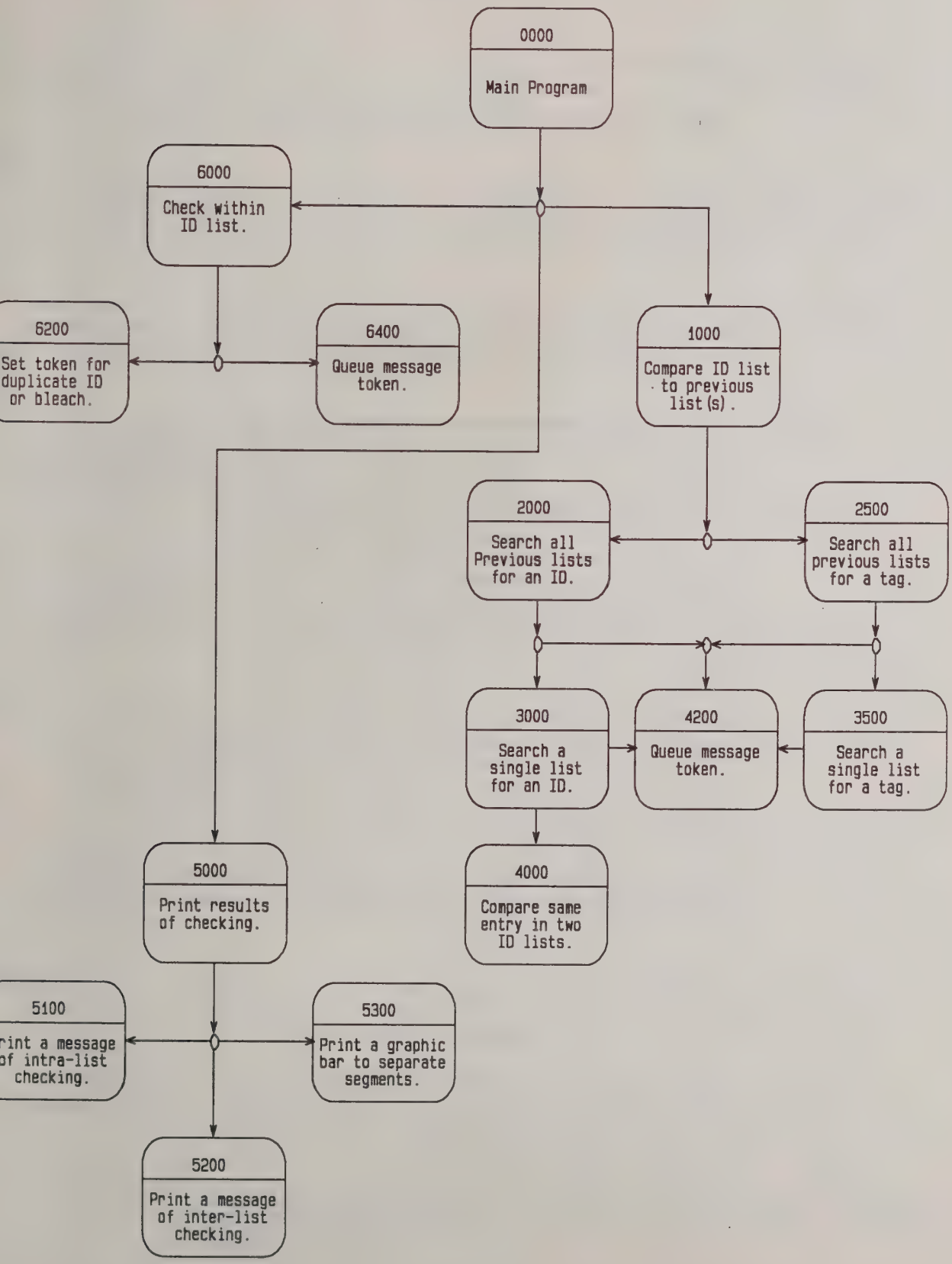
Support Operator Interface — Begins at line 8000

Input: Names of current and previous ID lists provided by operator.

Procedure: Requested files are opened and checked for proper island and year(s). Island and year from the current ID list are displayed, along with the run date from the Mohawk system. The array of names of previous ID lists is set up and filled in.

Output: The prepared files ready for processing. Error messages may also be produced.

Monk Seal ID List Checking Program - RM015M02



Appendix J.--Continued.

Monk Seal Census Data Formatting Routine - RM009T02

Main Program T02

Input: Invoked by RM009T01, with a data file of 80-column format monk seal data, with two record types, and an option file setting a source ID code filter.

Procedure: Initialize buffer, print title, and read option. If the first nine characters are "NO ID CHK", source ID code is not checked during the run, allowing unstandardized data (e.g., RM009AB1) to be trial formatted.

Combine input records into a single format, add sequence numbers, and write output file, counting the different types of records. The number of records written out is recorded for comparison when the final output (after sorting, renumbering, and more checking) is produced by RM009T03.

Put type 1 (page-header) records in columns 1-41, type 2 (line entries) in columns 42-106, batch number in columns 107-112, and sequence number in columns 113-120 of the output file. If no type 2 record follows a type 1 record, produce an output record with blanks where type 2 records are usually put.

When input file is exhausted, summarize activity and check that the total number of records read equals the number of type 1 and type 2 records processed, and the total number of records written equals the number of type 1 not followed by type 2 and type 2, less those containing no sighting information. Print the last output record.

Output: Invokes procedures NEXT, CYCLE. Modifies variables TAPE_REC, OPT, NT1, SEQ_NUM, NX1, NW. Produces printed output and writes SYSOUT and SYSNUM files.

Read a Type Two Record From the Input File NEXT

Input: Invoked by main program or CYCLE procedure.

Procedure: A record is read from the input file, counted, and discarded if it contains no sighting information (e.g., blank in columns 13-79 and sector is not "99").

Output: Modifies variables CARD, NR, NX2.

Appendix J.--Continued.

Process a Type One (Page Header) Record CYCLE

Input: Invoked by main program.

Procedure: Source ID code must be "RM009AC1" unless "NO ID CHK" option is used. Copy record to output buffer, count it, and read the next record. If there is no next record (e.g., end of file condition), blank out the area of the type 2 record and write the output buffer.

Output: Invokes procedure NEXT. Modifies variables TAPE_REC, NW1, NX1. In case of error, produces printed output.

Monk Seal Census Data Renumbering Routine - RM009T03

Main Program T03

Input: Invoked by Job Control Language contained in RM009T01 with formatted and sorted monk seal data (SYSIN), and expected record count (SYSNUM).

Procedure: Initialize variables, print title, and read input file. Detect any pair of adjacent records with certain identical fields brought together by sorting, printing a message, and deleting the second record of the pair. For data types "A" or "C", date, data type, island, number, and page number define unique pages. For other data types, beginning time and observer are included. Adjacent records with these fields the same are considered identical records.

If data type is "A", check the atoll count for completeness. If an atoll count number (columns 31-33) is present, all required island codes for the atoll must appear before the atoll count number changes. If no atoll count number is present, all island codes must appear before the date changes (i.e., the atoll survey must be completed in 1 d).

Change data type to "I" if the notes field is "L". Put new sequence numbers in columns 113-120 of the output file, since sorting may have reordered data from the original formatted version generated by RM009T02.

When input file is exhausted, summarize activity and verify number of records written to final output file, equals the number of records originally formatted by RM009T02, printing a warning if it does not. Print the last record generated.

Output: Invokes procedures BEG_ATL, REC_ATL, and CHK_ATL. Writes SYSOUT file. Modifies variables TAPE_REC, PREV_REC, ISLETS, ATL_FLAG, and ATL_DAY.

Appendix J.--Continued.

Begin An Atoll Count BEG_ATL

Input: Invoked by main program with the variable TAPE_REC.

Procedure: The first digit of the island code defines all the islands expected in a complete count. Set beginning date of the count, and set a status flag to show atoll count has begun. French Frigate Shoals, Pearl and Hermes, Midway, and Kure are the atolls. Print an error message if any other code is present.

Output: Modifies variables ISLETS, ATL_DAY, ATL_NUM, PREV_ISLE, and ATL_FLAG. In case of error, printed message is produced.

Record An Island Of An Atoll Count REC_ATL

Input: Invoked by main program with the variables TAPE_REC and ISLETS.

Procedure: An island within an atoll count is recorded by removing its code from those expected, and also indicating the island code removed to the following records. An unexpected island code causes an error message to be printed.

Output: Modifies variables ISLETS and PREV_ISLE. In case of error, printed message is produced.

Check That An Atoll Count Is Complete CHK_ATL

Input: Invoked by main program with the variable ISLETS.

Procedure: If any island codes remain of those required for a complete atoll count, they are printed in an error message. The status flag for atoll counts is set to show completion of an atoll count.

Output: Modifies variable ATL_FLAG. In case of error, printed message is produced.

Appendix J.--Continued.

Monk Seal Census Data Reverse Formatting Routine - RM009T04

Main Program T04

Input: Invoked by job control statements with a SYSIN file of monk seal census data in the 120-column format with a single type of record.

Procedure: Initialize buffer, print title, and read input file. Any change in the area where type 1 records appear (columns 1-41) indicates the beginning of a new page (i.e., generates a type 1 record in the dual format output file). Type 2 records are generated from columns 42-106 of the input file, unless those columns are blank.

Output: Writes SYSOUT file of census data in 80-column format, with two record types. Prints title and last record generated.

Appendix K.--Checklists of tasks to be performed after initial data entry and after completion of data checking.

I. After initial data entry:

1. Use Docutape to determine last file on AA tape.

2. Write new file to primary and backup AA tapes. Run Docutape and post new listing on wall.

3. Update TAPELIST.DOC and RM009AA1.DAT on Molecular for new tape file.

4. Check with Marine Mammals and Endangered Species Program (MMES) to determine whether data checking of new file is to begin immediately. If so, leave the new file on Mohawk; otherwise delete it.

5. Update BATCHNDX.DOC and ISLYRNDX.DOC on MMES computer.

6. Return original data to MMES.

II. After completion of data checking:

1. Use Docutape to determine last file on AC tape.

2. Submit Job Control Language (JCL) (RM009T01) to combine, format, and sort poststandardization data batches, and write the final data file to AC tape (see Table 9).

3. Check JCL output for error messages.

4. Check the final data listing for completeness.

5. Run Docutape to confirm final data file is on AC tape and post new listing on wall.

6. Copy final data file to backup AC tape and run Docutape.

7. Use RM009X02 to list each prestandardization batch on the Mohawk. Put each listing in proper brown folder.

8. Write prestandardization files on Mohawk to primary and backup AB tapes. Run Docutape and post new listing on wall.

9. Delete all pre- and poststandardization data files from Mohawk.

10. Rename ID list on Mohawk from a batch number (e.g., D85558A) to a seven-character island/year/ID designator (e.g., KUR84ID).

Appendix K.--Continued.

11. Write ID list on Mohawk to primary and backup RM015 tape. Run Docutape and post new listing on wall.

12. Write ID list on Mohawk to Mohawk floppy disk.

13. Use RM009X02 to list the ID list on Mohawk (twice). Put in brown folder.

14. Record dates of these final operations at the bottom of the Data Status Form inside each brown folder.

15. Update TAPELIST.DOC, RM009AB1.DAT, RM009AC1.DAT, and RM015AB1.DAT on Molecular for all new tape files.

16. Update BATCHNDX.DOC and ISLYRNDX.DOC on MMES computer.

17. Read final data file and ID list from tapes and write to floppy disk for transfer to MMES computer.

Appendix L

Changes to ID list _____

Date	Initial	Description of change	Dates new file written to: RM015 tape	Mohawk floppy	IBM PC/AT

Form HL-0161 (1/88)